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OF THE

ASIATIC SOCIETY OF BENGAL,

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"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away if they shall entirely cease."—Sir Wm. Jones.

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1853.

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* Withdrawn by the author, as irrelevant to his paper on the Dust Whirlwinds.

† Not received vide Note at the foot of page 621.

Pages 331 and 332 in No. IV. are to be replaced by the two pages of the same figures published in No. VII.

* Not received: vide note at the foot of page 621.

JOURNAL

OF THE

ASIATIC SOCIETY.

No. IV.—1852.

A Twenty-first Memoir on the Law of Storms in the Indian and China Seas; being the Cyclone of H. M. S. Fox, *in the Bay of Bengal, 30th April to 5th May* 1851. *By* Henry Piddington, *President of Marine Courts.*

In the following Memoir, for the materials of which I am principally indebted to the zeal of Capt. Biden of Madras, the same arrangement as with preceding ones has been adopted; that is, the documents are first given, and then a Tabular abstract of them, which is followed by a detailed statement of the grounds on which the various positions of the centre are laid down on the Chart, and by such observations on the various phenomena of the Cyclone as may have seemed necessary to direct attention to them.

Abridged extract from the Log of the Ship Diana, Capt. Fletcher, from Sydney, forwarded by Capt. C. Biden, Madras.

April 29th.—Moderate breeze during the night from W. S. W. to S. W. At 8 A. M. severe squall with heavy rain. Noon strong breeze and cloudy. Latitude by D. R. 1° 41′ S.; Long. by D. R. 86° 17′ E.

30th.—Fresh breeze with hard squalls and heavy rain and lightning. During these twenty-four hours wind veering from S. W. to West. Latitude by Obs. 00° 06′ N.; Long. by Obs. 86° 00′ E.

May 1st.—Fresh breeze with hard squalls and heavy rain; in reefs, and made all preparations for heavy weather, obliged to haul the foresail up

while the squalls lasted. Latitude by D. R. 1° 56′ N.; Long. by D. R. 86° 20′ E.

May 2nd.—Throughout these twenty-four hours strong gale with terrific squalls, accompanied with a deluge of rain and vivid lightning. Found the ship had been set by the current to the Eastward twenty miles, although heading N. W. by N. to W. N. W. Wind W. by S. to S. W. Latitude by Obs. 3° 04′ N.; Long. by Obs. 87° 00′ E. Fresh gale with hard squalls and heavy sea. Split main top-sail, handed fore-sail and fore top-sail.

May 3rd.—Hove ship to under close-reefed main top-sail. Noon more moderate, made sail again. Wind from W. S. W. to S. W. by S. Latitude by D. R. 4° 15′ N.; Long. by D. R. 87° 05′ E. Commences with fresh breeze and cloudy. At 8 P. M. severe gale with heavy sea. Hove ship to again under close-reefed main top-sail.

May 4th.—At 2 A. M. more moderate, made sail again. Noon, blowing hard, handed main-sail. Wind W. S. W. to S. W. by S. Latitude by D. R. 4° 50′ N.; Long. by D. R. 86° 50′ E. Strong gale throughout.

May 5th.—At 11 A. M. ship hove to sixteen hours during this day's log. Wind S. W. to S. S. W. Latitude by D. R. 5°. 4′; Long. by D. R. 86° 10′ E. Commencing with squalls and wind more moderate. At 8 P. M. blowing hard with heavy squalls during the night.

May 6th.—Noon. Ditto W. wind S. S. W. to S. W. Latitude by Obs. 5°. 23 N.; Long. by Obs. 85° 44′ E.

Extract from Log Barque Hannah, Capt. H. Smith, from Penang bound to Madras. Civil Time. Forwarded by Capt. C. Biden.

Tuesday, April 29th.—Commences with gloomy and unsettled weather throughout the forenoon. P. M. calm with very unsettled and squally appearance round the compass and *heavy swell from the southward.* Midnight moderate breeze from the westward and clear. Lat. D. R. 8° N.; Long. 82° 50′.

Wednesday, April 30th.—Daylight fine with westerly wind, coast of Ceylon in sight, Friar's Hood bearing W. S. W. Noon calm, P. M. weather looking again very unsettled and squally. 2 P. M. wind round the compass with heavy rain. 5 P. M. strong breeze sprung up suddenly from the W. N. W. with very threatening appearance all round the compass, in first reef of top-sails, 6 P. M. tacked ship, wind westerly, midnight moderate breeze and clear. Lat. 7° 50′; Long. 82° 08′.

Thursday, May 1st.—Daylight, light drizzling rain appearing from the N. N. W. wind variable and puffy; down main royal yard, in second reef of top-sails; towards noon heavy squalls from the westward and much rain

with heavy cross sea. P. M. tremendous squalls in quick succession from W. S. W. and S. Westward with every appearance at times of a gale of wind, at other times clearing as quickly. 3 P. M. battened down hatches fore and aft, got all prepared for bad weather. During this night strong squalls from the South-westward with heavy thunder and lightning and rain: *between the squalls quite calm, the ship often loosing steerage way*—the sea awfully confused. Lat. 8° 40′ N.; Long. 81° 43 E.

Friday, May 2nd.—Daylight steering to the N. N. Westward with strong gale and cross sea, ship knocking about awfully, sent down mizen topmast; 8 A. M. wore ship finding the gale increase while the ship's head was to the Northward; kept the wind free for about two hours, trying to push to the Southward; but the cross sea increased so rapidly, threatening to sweep the decks every minute, were compelled to lay to under main topsail and canvas in the mizen rigging; main topsail yard went near the slings; noon gale increasing with tremendous squalls and rain; P. M. saw a barque running to the Eastward under closed-reefed topsails and reefed foresails, wind Westerly, veering about two points each way, sea running very high and confused, ship labouring much, often dipping the lee quarter boat in the water. 10 P. M. during this night all hands including native passengers slept in the cabin. Lat. D. R. 8° 40′ N.; Long. D. R. 82° 10′ E.

Saturday, May 3rd.—Daylight clear, blowing a hard gale of wind from the Westward with awful sea; noon moderating, made sail and wore ship to the N. Westward, weather moderate and clear; towards midnight gale increasing; in main topsail, courses and jib; during this night blowing hard with heavy puffs, wind Westerly. Lat. D. R. 8° 53′ N.; Long. 82° 25′ E.

Sunday, May 4th.—Daylight fine, wind moderating, set courses and main topsail. Noon do. weather, wind S. W. by W. with heavy cross sea, weather continuing clear. Midnight gale increasing with tremendous puffs of wind; in mainsail and jib. Lat. D. R. 9° 00′ N.; Long. 83° 00′ E.

Monday, May 5th.—Moderating, set mainsail and jib, all hands employed during the day repairing damages aloft, &c. Noon P. M. blowing hard with confused sea in mainsail and jib. Lat. D. R. 9° 40′ N.; Long. 81° 50′ E.

Tuesday, May 6th.—Daylight blowing hard, wind steady with very fine weather aloft. 8 A. M. moderating set mainsail and jib. 10 P. M. suddenly lost the strength of the wind, saw the land of Nagore, bearing West. Noon out all reefs. Lat. Obs. 11° 4′ Long. 80°; 10′.

Extract from the Log of H. M. S. Fox, Commodore Lambert; from Trincomalie bound to Madras. Civil Time. Log forwarded by Capt. C. Biden, M. A. Madras. A few additions from the newspaper abstract.

At Noon 1st May, 1851.—H. M. S. *Fox* was by Acct. in Lat. 8° 57′ N.; Long. 81° 17′ (Madras bearing N. 13° W. 256 miles) standing to the N. ½ W. and N. ½ E. to midnight 7½ to 2½ knots. Wind variable from W. b. N. to W. N. W. force (6) to (9).* Weather thick and squally with thunder, lightning and rain. Bar. *rising* from 29.67 at 3 P. M. to 29.74 at midnight; Ther. 82°. The direction in which the lightning was seen is not given.

2nd May.—A. M. wind variable from North to W. b. N. Force (5) to (9) at noon marked N. N. W. (9.) Ship standing to the N. East. Bar. 8 A. M. 29.67; at noon 29.60; Ther. 82°. Squally, thick rainy weather throughout. Noon, Lat. Acct. 10° 0′ N.; Long. 81° 38′ E. P. M. gale increasing to a hurricane; force marked (10) and (11.) Wind N. N. W. to 8 P. M. when W. N. W. again; at midnight ship heading to the N. E. Bar. 5 P. M. 29.53; at 8, 29.50; midnight, 29.47; ship lurching heavily and lying to under a close-reefed main topsail.

3rd May.—A. M. wind N. N. W. very heavy squalls (9) to (11). Bar. 29.37; at 6 A. M. W. b. N. (8) to (10). Bar. fell to 29.30: Symp. 29.20; at 9 (10); and at 9h 45′ (12) when the ship was obliged to bear up for the safety of her masts; running 12 knots under the remnants of her close-reefed main topsail having previously lost the jibboom while lying with the lee quarter deck guns at times in the water:† heavy and confused sea on. At 4 A. M. the Bar. is marked 29.33; and at noon 29.37; Ther. 82°. Heavy squalls sea rain and thick weather. Noon Lat. 10° 21′ N.; Long. 82° 40′ East. Wind W. S. W. To midnight, ship scudding to the East and E. b. S 70.3 miles in the 12h. Wind W. N. W. W. S. W. and S. W, (9) to (11) throughout.‡ Bar. 29.40 at 4 P. M. and 29.50 at 10 P. M.

4th May.—A. M. wind S. S. W. (11). Ship standing at 7 A. M. to the E. b. S. and at 8 hauled to the N. West. Wind till noon S. S. W. (9) to (10). Squally but clearing at times, Bar. 29.57 to 29.70 at 10 A. M. Noon Lat. Acct. 10° 22′ N.; Long. by Chr. 84° 35′. P. M. wind South to S. b. W. (8) to (10). Ship standing to the Westward. Gale decreasing, cloudy and squally. Bar. 29.70 to 29.72 at midnight; Ther. not marked.

5th May.—A. M. wind South, to noon (7) to (9). Ship standing to the Westward, squally with cloudy and blue sky. Bar. 29.74 to 29.80 at

* Admiral Beaufort's numbers. † From a notice in the Nautical Magazine.
‡ So in MSS. Log; though this must be an error.

noon; Ther. 84°; Noon Lat. Obs. 10° 25′ North; Long. Chr. 83° 55′ East. P. M. to Midnight, weather fair. Wind S. S. W. to South.

Extract from the Log of Ship Mary Ann, Capt. Darby; from Swan River bound to Madras. Civil Time. Forwarded by Capt. Biden.

Wednesday, April 30th.—Light winds and variable from S. W. to North with heavy rain during the night. Bar. 29.67; Aneroid 29.65. Very close and sultry. Ther. 84; Lat. Obs. 9° 48′ N.; Lat. by double Alt. 9° 50′ N.; Lat. by Obs. 9° 47′ N.; Long. by Chr 81° 33′ 48″ E.

Thursday, May 1st.—First part light breeze from the North. Noon wind variable from the Westward and North with rain; double-reefed topsails at 4 P. M. During the night very dull and oppressive weather, a few stars appeared but unable to obtain sights. Lat. by Account 10° 31. N.; Long. by Account 81° 8′ E.; Bar. 29.60; Aneroid 29.60; Ther. 81.

Friday, May 2nd.—Strong gale and very variable from N. N. E. to N. W. with heavy rain, never ceasing in the 24 hours; during the night much heavy thunder and lightning in the Northern quarter, close reefed topsails and furled all but main topsail: 8, hove too under close-reefed main topsail. 3 P. M. Barometer still falling to 29.40. Sent down royal yards and made the ship snug for the night. Noon, Lat. by Acct. 10° 38′ N.; Long. by Acct. 81° 17′ E.; Bar. 29.52; Aneroid 29.53; Ther. 82.

Saturday, May 3rd.—Blowing a severe gale with heavy rain and terrific squalls at daylight; at 4 A. M. Barometer 29.30. Ship lying to under close-reefed main topsail. Noon, Barometer 29.33; P. M. still blowing hard, with less rain toward evening. Midnight, Barometer 29.30. Wind from West to S. West.

Sunday, May 4th.—A. M. blowing still a gale, and sea much confused, lying to under main topsail. Noon a most fearful sea struck the ship, and filled the deck full of water. No sights. Lat. Acct. 11° 49′ N.; Long. Acct. 82° 34′ E.; Bar. 29.38; Aneroid 29.35; Ther. 82; P. M. blowing hard with high sea; at 8, more moderate. Wind at S. S. W. set close-reefed fore top-sail and reached her under the two top-sails. Midnight, Bar. 29.40 in. clined to rise.

Monday, May 5th.—A. M. wind inclined to moderate, but heavy sea running; at daylight, Barometer 29.45. Noon more moderate, made sail. Lat. by Obs. 10° 11′; Long. by Chr. 82° 20′; Bar. 29.55; Aneroid 29.55; Ther. 84.

Extract from the Log of the Schooner Joseph Manook from Swan River to Calcutta, by Capt. H. S. Dick. Civil Time.

Memorandum—I have compared this with the vessel's Log and made a few additions. H. P.

We had heavy N. W. squalls from 1° 30′ to 6° N. Being then sheltered by Ceylon the wind became light and variable. I wished to call in at Madras, so kept as much to the Westward as possible, and in Lat. 10° 30′ N. and Long. 81° 8′ E. on the—

1*st May*—The Barometer began to fall from 29.82 to 29.72; Ther. 82° with heavy dark appearance and much rain: at 5 P. M. Civil Time, tacked to the S. W. wind W. N. W. and the Bar. had risen to 29.78. Midnight very heavy N. W. squalls and much lightning to the Eastward. Bar. 29.78: close-reefed and sent top gallant yards upon deck.

May 2*nd*.—Wore to the N. West; wind West; Bar. 29.77; at 3 A. M. wind North, blowing hard with every appearance of a gale, though the Bar. high, being 29.78; at daylight weather the same, Bar, 29.78: at 8 A. M. down main topmast and in flying jibboom, Bar. 29.74; 11 A. M. blowing hard from N. N. W. and a high sea: in topsail. Noon Lat. by account 10° 40′ N.; Long. 81° 3′ E.; Bar. 29.72; blowing very hard, and a high sea running; at 2 P. M. Bar. 29.64 wind N. W. by W. blowing half a gale, hove the vessel to under storm sail, with her head to the North Eastward, the sea running very high with rain. Midnight ditto weather Bar. 29.56.

May 3*rd*.—1 A. M. blowing hard with rain; wind N. W.; Bar. 29.48; at 8 A. M. but little wind, vessel would not steer, but a heavy confused sea; at 7.30, a heavy gust from N. W.; Bar. 29.46; at 8 A. M. hard gale from W. N. W. and a tremendous heavy confused sea; Bar. 29.45; at 9 A. M. blowing with most violent gusts from West, shipped several heavy seas over the poop, unshipped the binnacle. The third sea washed the man from the helm nearly overboard; I ordered the helm to be lashed a lee as it was not safe for a man to remain there, had my tell tale compass screwed up under the top gallant forecastle; wind West by N.; Bar. 29.44; after 9 A. M. all hatches battened down, could not note the Bar., but the wind West, blowing in most furious gusts; at 4 P. M. opened one board of the hatch for some biscuits and to note the Bar. which was then 29.44; closed up the hatches for the night, so could not note the Bar.; wind during the night from W. to W. by S. blowing in most fearful gusts.

May 4*th*.—Daylight more moderate; wind W. by S. opened companion hatch and found the Bar. risen to 29.59; at 10, wind S. W. set reefed trysail and storm staysail; Bar. 29.62. Noon fresh gales with a tremend-

ous sea; Bar. 29.64; at 4 P. M. fine appearance but the Bar. had fallen to 29.59. I supposed by setting the trysail and staysail, we had made head way to the N. W. into bad weather again, wind S. S. W. wore ship to the S. E.; at 8 P. M. decreasing gales and fine appearance, sea still very high: Bar. 29.73. Midnight strong gales from South, Bar. 29.75.

May 5th.—At 4 A. M. fresh gales and the sea very high, Bar. 29.76. Daylight fine. Blowing hard from the Southward and the sea running very high. I gave up all thoughts of going to Madras, as it was not prudent to stand to the N. W.; at 8 A. M. Bar 29.78; made sail and stood to the N. E. for Calcutta. Noon a very high sea; wind South; Bar. 29.86 and fine weather; Lat. 10° 49′; Long. 83° 35′ having been set to the S. S. E. 160 miles during 3½ days' gale. Midnight cloudy with rain; Bar. 29.90; sea still very high.

May 6th.—Fine clear weather; wind S. S. W.; Lat. 13° 26′; Long. 84° 21′; Bar. 29,96.

My little vessel rode most gallantly over the seas, with only a very small storm mainsail set, coming up and falling off only one point each way; I was never in so heavy a breeze before, it seemed almost impossible the little vessel could live in such a cross confused sea. By your book I fancy I was upon the right tack though perhaps you will censure me for not running to the S. E. but I thought it would only be a common monsoon gale which we expect in these months or I should have done so; and coming from the Southward we have had our Bar. ranging high, I thought nothing of the fall till it was below 29.67; as I have often had it as low as that in the bay during the S. W. monsoon for 6 and 7 days together.

Extract from the Log of the H. C. Steamer Hugh Lindsay from Paumbum and Cuddalore to Madras. Civil Time. Forwarded by Capt. Biden.

On the 2nd May, 1851.—The *Hugh Lindsay* at Noon had Porto Novo Chimney bearing S. W. Moderate breezes S. W. b. W. and heavy rain; Bar. 29.77. At 5, anchored at Tranquebar. At Midnight heavy squalls of wind and rain with lightning and thunder, and threatening appearances from the N. West with a heavy swell on. Wind W. N. W.; Bar. at 4 P. M, 29.69.

May 3rd.—A. M. the same; and a thick gloomy appearance all round; weighed at 3.30 A. M. At 7.30 A. M. wind W. N. W. Nagore Pagoda N. W. finding the wind and sea fast increasing, and every appearance of a heavy gale stood out to sea instead of anchoring at Negapatam. Bar. 29.40;*

* So in MSS. but apparently an error; 29.70 was probably meant?

at 2 A. M.: 29.62 at 8 A. M.: 29.60 at Noon, when eased the engines and hove to. P. M. N. W. to W. N. W. fresh gale and incessant rain. 9 P. M. Westerly. Sunset to Midnight, heavy squalls of wind and rain with a heavy sea. Bar. 29.55 at 2 P. M., to 29.58 at Midnight.

May 4th.—A. M. fresh gales, heavy sea and constant rain increasing at daylight to heavy gusts and a heavy sea running, all around thick and misty of a dull red colour. At noon the same. No observations. Bar. 29.50 at 2 A. M.;* at 4, 29.50; at 6, 29.52; at 8, 29.54; at 10, 29.58; and at Noon 29.57. Wind marked for the twelve hours Westerly to S. W. P. M. wind S. W. very heavy squalls and sea running very high. 4 P. M. moderating to Midnight. Bar. 29.52 at 2 P. M., to 29.70 at Midnight.

May 5th.—Weather becoming fine. Lat. Obs. 9° 59′ N.; Long. Chr. 81° 49′ East.

Register of Winds kept on board the dredging vessel at the Paumbum Channel, by Mr. Colin Gib, Superintendant, and forwarded by Capt. Biden.

May 1st.—Wind S. W. Blowing fresh all day with heavy rain, thunder and lightning.

May 2nd.—Wind N. N. W. Fresh breeze during the 1st part of the day accompanied with rain; at about 5 P. M. breeze freshened considerably with heavy rain; and at about 9 o'clock it had increased to a hard gale, with tremendous gusts at short intervals; in one of which the Port chain cable of the steam dredge snapped; held on, however, with the remaining four; wind veering frequently from S. W. to N. N. W.

May 3rd.—Wind S. W. Blowing a hard gale with violent squalls at times.

May 4th.—Wind S. W. Blowing a gale of wind; and although sheltered by the Islands and reef there was a heavy sea running at the Buoy. Dredge riding uneasily.

May 5th.—Wind S. S. W. Gale still continues, but the squalls neither so frequent nor so violent.

May 6th.—Wind S. S. W. Blowing fresh; weather more settled, gale evidently broken.

Abridged Extract from the Log of the Barque Sarah from the Nicobars to Madras, forwarded by Capt. Biden. Civil Time.

The *Sarah* was from the 28th to the 30th April with squalls from the S. W. and calms near the Nicobar Islands.

* So in MSS. though 29.58 is marked at Midnight.

April 30th, 1851.—At Noon, the *Sarah* was in Lat, by Obs. 6° 36′ N.; Long, 93° 12′ East. P. M. fresh S. S. W. winds and fine, increasing to Midnight, when cloudy with heavy squalls of wind and rain.

May 1st.—A. M. increasing from S. S. W. with heavy squalls and a high sea running, to daylight, when hard gales and heavy gusts "*veering from South to S. W.*" Hove to at 8, under bare poles. Noon, successive heavy gusts with a continuation of hard rain and heavy seas, with thick weather from the S. W. P. M. lying to under bare poles "*with continued heavy gusts of wind from South to S. W.*" Midnight blowing a perfect hurricane.

May 2nd.—Begins with continued heavy gusts blowing, and rain making "a mere drift of wind South to S. W." Noon, moderating a little. 2 P. M. increasing again; and at 7 P. M. hurricane with an awful heavy sea. Midnight more moderate, made some sail.

May 3rd.—Daylight, heavy gusts again, moderating at times, and P. M. successive heavy squalls from S. to S. W. are marked. At Midnight strong breezes and squalls.

May 4th.—Apparently the monsoon breeze, with squalls, and on—

May 5th.—The Lat. by Obs. is marked 10° 40′ N.; Long. 86° 10′ East. The *Sarah* had no Barometer on board, and no positions by D. R. are given during the bad weather.

Extract from the Log of the Barque Ostrich, Capt. Stephenson, from Madras bound to Moulmein. Civil Time. Log forwarded by Capt. Biden.

The *Ostrich* sailed from Madras on the 28th April, and on—

May 1st, 1851, at Noon, was in Lat. 14° 19′ N.; Long. 82° 45′ East; with wind from the E. N. E. and squally weather at Midnight. Bar. at Noon is marked at 29.75; Symp. 29.84; Ther. 84°.

May 2nd.—A. M. wind E. N. E; at 8, East; and at Noon E. N. E. again; heavy squalls with rain. Lat. 13° 10′ North; Long. 83° 10′ E.; Bar. marked for Noon at 29.60; Symp. 29.75; Ther. 83°. Midnight increasing gale and heavy squalls.

May 3rd.—Making all snug for bad weather. Violent squalls. A. M. wind E. b. N.; at 8, East; Noon to Midnight continued and increasing squalls, rain, and sea. Noon Lat. 12° 46′ N.; Long. 83° 00′; Bar. 29.40; Symp. 29.60; Ther. 82°.

May 4th.—A. M. wind S. East. Strong gale and heavy squalls. Noon more moderate Lat. 13° 4′ North; Long. 82° 21′ East; Bar. 29.33; Symp.

29.39; Ther. 84°. At 2, P. M. wind E. S. E.; at 8, increasing again to Midnight, when wind is marked S. E.

May 5th.—A. M. wind S. S. E. Strong gales; 6 more moderate; under some sail, Bar. being at 2 A. M. at 29.26; Symp. 29.31, after which they began to rise. Noon Lat. 14° 54′ North; Long. 82° 37′ East; Bar. 29.60: Symp. 29.80; Ther. 83°. Midnight, out reefs.

Abstract from the Log of the P. and O. Company's Steamer, Precursor, from Point de Galle towards Aden. Civil Time. Forwarded by Mr. Parfitt, Chief Officer.

The *Precursor* left Point de Galle at 6.20 P. M. on the 30th April. Wind and sea increasing from W. b. S. Bar. 29.77 to 29.76 at Midnight, Sympiesometer not in good order: Ther. 81°.

May 1st, 1851.—A. M. strong winds W. b. S. and cloudy; heavy head sea and frequent squalls. 4 A. M. Bar. 29.74; Ther. 83°; at 8 A. M. Bar. 29.79. Noon more moderate, but very heavy sea, Lat. by Obs. 5° 5′ N.; Long. 77° 3′ East; Bar. 29.80; Ther. 85°. P. M. wind W. b. N. 4 P. M. Bar. 29.72; at 8, 29.82; Midnight 29.82. Wind and weather the same.

May 2nd.—Moderating to Noon when Lat. 3° 21′ North; Long. 78° 18′ East; Bar. 29.88; Current S. 55° E. 41 miles.

Abridged Log of the Ship Hyderabad, Capt. Castles; from Calcutta to the Mauritius, reduced to Civil Time. Forwarded by Capt. C. Biden.

May 3rd.—P. M. Lat. by Acct. (worked back from Noon of the 4th) 14° 05′ N.; Long. 83° 47′ East; 1 P. M. Bar. 28.90. Strong breezes from the East. Ship standing S. S. W. 6 P. M. wind E. S. E.; increasing, with a confused sea to Midnight. Bar. 28.80 at 8 P. M. and Midnight.

May 4th.—Increasing gales with a very heavy head sea; made all snug. Wind S. E. b. E. from 6 A. M. Noon blowing "a drift of wind." Lat. 12° 30′ N.; Long. 82° 20′ East; Bar. 28.74. Sea running very high. Ship running 4 knots per hour to the W. S. W.; P. M. the same; at 4, complete hurricane; ship on her beam ends for upwards of two hours; decks swept continually of every thing. Bar. from 28.74; at 1 P. M. to 28.70 at Midnight. Drift about $\frac{1}{2}$ mile per hour. Wind for the P. M. and A. M. of the 5th is said to have been "mostly from S. E. b. E. to East; gradually veering to the Southward throughout the latter part."

May 5th.—At 4 A. M. Bar. 28.71; at 8, 28.72. Noon hard gale with a heavy sea. Wind about S. E. b. S. Noon Lat. by Acct. 12° 50′ N.; Long.

81° 40′ East; Bar. not marked; P. M. Bar. 28.74; more moderate, but a tremendous head sea. Wind E. b. S. at 8 P. M.; Bar. 28.80 at Midnight, and weather more settled.

May 6th.—At 4 A. M. Bar. 28.84. 5, wind E. S. E. Noon moderate Lat. 13° 57′ N.; Long. 82° 37′ East. Wind S. S. W.

Abridged Extract from the Log of the Ship Mary Harrison; from Sonapore to Madras; by Mr. J. Sutherland, Chief Officer; forwarded by Capt. Biden. Civil Time.

May 2*nd.*—Wind N. E. to N. N. E. at Noon, and then N. b. W. to N. E. again. Bar. falling from 29.60 A. M. to 29.50 at Noon; and 29.40 at Midnight; Ther. from 85½ to 83½. Squally and cloudy making preparations for bad weather. Heavy swell from S. E. and threatening appearance. Position at Noon Lat. 13° 41′ N.; Long. 82° 15′ East.

May 3*rd.*—Wind marked North to N. N. W. 4 A. M. Bar. 29.38; Noon 29.36; Midnight 29.30: Ther. 83½. Position at Noon Lat. 13° 12′ North; Long. 81° 28′ East. A. M. very squally; made all snug and hove to at 8 P. M. under close-reefed main topsail.

May 4th.—A. M. wind North. 8 A. M. N. N. W.; 8 P. M. N. W.; 10 P. M. shift to S. W. Bar. A. M. 29.30; Noon 29.05; 8 P. M. 28.91; 10 P. M. 28.80; Midnight 28.80. Position at Noon; Lat. by Acct. 12° 41′ N.; Long. 81° 38′ East. A. M. strong gale, and heavy sea getting up; "at 8 P. M. *cleared up and wind moderated a little; at* 10 P. M. *sudden shift to S. W. throwing the ship almost on her beam ends;*" lost main topsail, jibboom, &c.

May 5th.—A. M. "storm raging with unabated fury;" 4 A. M. heaviest; 4.30 A. M. abated to a strong gale; 5 A. M. Bar. started almost instantly from 28.80 to 29.03." Very confused sea, but ship behaving very well, wind throughout, S. S. W. to South. Noon, Lat. Acct. 13° 11′ N.; Long. 81° 50′ East; Bar. A. M. 28.84; at 5 A. M. 22.03; Midnight 29.58: Ther. 82° to 83½.

May 6th.—Confused irregular sea, but weather gradually becoming fine. Bar. 29.60 to 29.72; at Midnight Ther. 84°. Noon Lat. 13° 23′ North; Long. 81° 52′ East.

Register of Day Observations taken by Capt. W. Farley, Actg. Master Attendant at Cocanada.

Date.	Sunrise.				At 10 A. M.				At 2 P. M.				Sunset.				Remarks.
	Bar.	Ther.	Winds.	Aspect.	Bar.	Ther.	Winds.	Aspect.	Bar.	Ther.	Winds.	Aspect.	Bar.	Ther.	Winds.	Aspect.	
May 1	29.84	85°	East.	Hazy.	29.81	88°	East.	Clear.	29.78	94°	S. S. E.	Clear.	29.76	87°	S. E.	Hazy.	1st.—Faint airs and calms with sultry weather in the evening pleasant Easterly winds.
„ 2	29.83	85	E. N. E.	Cloudy.	29.83	93	N. E.	Cloudy.	29.83	93	N. E.	Cloudy.	29.72	87	N. E.	Gloomy.	2nd.—Threatening appearances of heavy weather in the Bay; scud passing to the Southward prodigiously.
„ 3	29.83	93	N. E.	Dark.	29.75	83	N. E.	Ditto.	29.75	83	N. E.	Ditto.	29.70	85	N. E.	Cloudy.	3rd. — Strong gales throughout and cloudy, attended with violent squalls and heavy rains and threatening weather to S. Eastward.
„ 4	29.73	82	N. E.	Cloudy.	29.73	83	N. E.	Ditto.	29.70	82	N. E.	Ditto.	29.70	82	N. E.	Ditto.	4th.—Continuation of the weather of the preceding day; heavy rains during the night.
„ 5	29.70	82	E. N. E.	Ditto.	29.77	84	East.	Ditto.	29 72	83	East.	Ditto.	29.70	82	S. E.	Ditto.	5th.—Commences with more moderate wind but a continuation of the weather. Noon fine.
„ 6	29.88	83	S. E.	Ditto.	29.75	83	South.	Ditto.	29.73	83	S. S. W.	Ditto.	29.70	82	S. S. W.	Ditto.	6th.—Moderate and fine.

Observe.—The Barometers among the shipping ranged between 29.25 to 29.30. The same at Talarow in the residence of a Mr. Eaton, some 12 miles hence during the blow on the 3rd May. The winds were steady at N. E. for three days and gradually moderating; in the meantime veering to the Eastward by S. and S. E.

Extract from the Log of the Ship Catherine Apcar, Capt. Fowler; from Mauritius to Calcutta. Reduced to Civil Time.

May 2nd, 1851.—Midnight, dark cloudy, unsettled weather with variable winds; 4 to 8 A. M. calms; 8 to 12, wind West to S. W., 5 knot breeze. Noon, Bar. 29.49; Symp. 29.20; Lat. Acct. 10° 44′ North; Long. 84° 14′ East. P. M. light winds and calms, gloomy threatening appearance; 4, freshening from Eastward; at 8, strong gusts making preparations for bad weather. Bar. 29.43; Symp. 29.18. Midnight, hard squalls and rain. Wind Easterly.

May 3rd.—Dark cloudy and blowing very heavy at times. 2 A. M. wind E. S. E.; 3, Bar. 29.33; Symp. 29.12; 5, wind still E. S. E. Bore up North. Bar. 29.29; Symp. 29.12; Noon strong breezes E. S. E.; Bar. 29.40; Lat. Obs. 12° 40′; Long. Chr. 83° 32′. Throughout the preceding 24 hours very heavy clouds hanging about the horizon, hot sultry weather and gloomy appearance, squalls heavy at times with heavy rain, but little or no sea on. P. M. fresh gale Easterly. Ship standing North; 8, Bar. 29.50. Midnight, dense masses of clouds and hard squalls.

May 4th.—Hard squalls; 8 A. M. fresh gales E. b. S.; at 11, a terrific squall; Noon, strong gales and heavy sea; Lat. 15° 13′ N.; Long. 82° 66 E. Current N. 51 W. 33 miles. During the last 24 hours steady gales East and E. S. E. with hard squalls and much rain. P. M. the same decreasing at sunset; 9 P. M. wind S. East.

May 5th.—Wind hauling to S. S. E.; Daylight moderate; Noon fresh breeze and squally. Lat. 16° 42′ N.; Long. 84° 25′ East; Bar. 29.67; Simp. 29.46; Current, N. 78 East 39 miles.

Extract from the Log of the Ship "Atalanta," Capt. R. F. D. Towle; from Coringa bound to Pondicherry, forwarded by Capt. Biden.

April 30th, 1851.—Light winds throughout from S. S. E.: S. E. and E. S. E. with occasional calms and slight showers, Lat. 12° 45′ N.; Long. Chr. 83° 58′ E.; Bar. Noon 29.80.

May 1st.—Variable winds *with fluctuating Bar.* Smart squalls from East, veering to N. E. and N. N. W. Steered S. b. W.: S. S. W. and S. W. At Noon gloomy all round with drizzling rain, wind light at N. E. Lat. Acct. 11° 34′ N.; Long. Acct. 83° 40′ E.; Bar. Midnight 29.76; 4 A. M. 29.66; 8 A. M. 29.72; Noon 29.75; Bar. 3 P. M. 29.61; 5, 29.63; 6, 29.66; 8, 29.68; 9, 29.70; 11, 29.70. Light winds and cloudy. At 11 P. M dark gloomy weather with drizzling rain, winds flying about from S. E. to

E. S. E. East, N. E. and N. N. W. At Midnight, winds light and variable from N. N. W., N. E. and E. S. E. with vivid lightning, showing a heavy black bank to the Southward.

May 2nd.—In all sail. At 0.30 a hard squall from E. S. E. with heavy rain, thunder and lightning, kept away West under topmast staysail. At 2 A. M. light winds from N. N. W. round to East, and back again. At 5 A. M. wind apparently steady at North ; set double-reefed topsails, foresail, and bent and set a new fore topmast staysail (the other having split) steered South and S. S. W. At 10 A. M. a threatening appearance all round, wind veering in heavy gusts from North to N. W. in all sail and scudded South under fore topmast staysail. Supposing from appearances this to be the commencement of a hurricane or heavy gale, the centre of which would now be about E. N. E. of us, the wind being N. N. W. kept South to run out of it, according to the theory of storms and made all snug. Noon dark gloomy weather Bar. fast falling, sea getting up and wind agitated with every indication of a gale, wind *flying about from North to N. W. and vice versâ* with heavy puffs and rain. Got stay tackles on foremast to cat-heads. Ship scudding as before South and S. S. W. under fore topmast staysail. 2 A. M. Bar. 29.64; 4, 29.64; 5, 29.66; 8, 29.64; 9, 29.63; Noon 29.61; Lat. Acct. 10° 46′ N.; Long. Acct. 81° 41′ E. P. M. strong gales, from N. N. W. dark gloomy weather and heavy rain. Ship scudding South, under fore-topmast staysail. At 3 P. M. constant heavy squalls, rain and a high sea. Lashed the courses and fore topsail to the yards with studding sail gear, and jib to the boom. At 5 P. M. Barometer still falling, squalls more frequent and very heavy, accompanied with a torrent of rain. Close reefed and set main topsail, and hove ship to on port tack. Wind then at N. N. W. Head up to N. E. off to East. At 6 P. M. the wind shifted in a furious squall to W. N. W. then to West. We on the right tack to meet it. Ship's head up North, off N. E. with the sea. Midnight blowing a heavy gale, squalls harder and more frequent with a deluge of rain and scud, a tremendous sea running and ship lurching heavily, as well as shipping a great quantity of water over all every time she lurched to leeward. Bar. 3 P. M. 29.55; 5, 29.53; 7, 29.51; 8, 29.58; 10, 29.56; Midnight 29.56.

May 3rd.—A. M. gale blowing with unabated fury, violent squalls and rain as before. Sea running in Pyramids. *At 4 A. M. frequent lulls of two to five minutes duration followed by furious gusts*, in one of which the main topsail blew away, as also the lee side of mainsail. Ship lurching heavily and shipping much water over all. Noon, blowing a hurricane at W. S. W. Ship's head up N. N. W., off to North. 2 A. M. Bar. 29.52;

4, 29.54; 6, 29.55; 9, 29.60; 11, 29.54; Noon 29.54; Ther. 79°.* P. M. furious squalls from W. S. W. heavy rain and high sea. Ship lurching violently at times and shipping much water. Hove to under bare poles. Head up N. N. W. off N. N. E.

May 4th.—Midnight, the wind shifted to the S. W. blowing with the same fury. *Lulls between the gusts as yesterday.* A constant wash of water across the deck, vessel making no water to speak of. Noon, squalls less frequent and violent. Still blowing hard with heavy confused sea. 2 P. M. Bar. 29.54; 4, 29.49; 8, 29.50; Midnight 29.56. P. M. strong gales from S. W. with heavy confused sea; got a new fore royal in the mizen rigging to keep the ship to the wind. Head up W. N. W. off N. W. b. N. At 6, the mizen stay carried away close to the main mast, got a tackle on it and set it taut. At 9 P. M. gale fast abating and sea going down. 10, Lat. per Mer. Alt. 41° 46′ N.; 10.30 P. M. Lat. per Mer Alt. Spica 10° 47′ N. Wind at South. 2 A. M Bar. 29.54; 4, 29.52; 8, 29.58; 10, 29.66; Noon 64; Ther. 82°. Bar. 2 P. M. 29.64; 8, 29.68; Midnight 70.

May 5th.—Midnight, moderate and fine with confused sea, and lightning to the N. W. Daylight ditto weather with high sea. Noon, fresh steady breezes with fine clear weather. A confused sea still running. Lat. Obs. 10° 53′ N.; Long. Chr. 83° 34′ E.: Bar. 29.80; Ther. 85°. Set the jib. 8 A. M. Bar. 29.75; Noon 80.

Notes of the Weather experienced at Vizagapatam between the 30th April and 6th May, 1851, by G. Hudson, Esq. Master Attendant.

Wednesday, April 30th.—Variable light airs and sultry weather throughout. *An unusually clear atmosphere* without a cloud in the sky. The sea very smooth and of a dark blue color. *The distant hills around (at other times obscured by haze) presented a bright and clear appearance,* and the verdure on them was perceptible to the naked eye. Bar. 29.80. †

Thursday, May 1st.—The first part of this day light airs from the N. W. inclining to a calm. Sun bright and powerful. Bar. 29.80. *Emily* 29° 85′.

Noon, light Northerly airs vecring to N. E. and continued in that quarter to the evening. A smooth sea and a long swell setting in from the Eastward.

* No position given.

† This range of Barometer is from the Log of the Bark "*Emily*" wrecked at Bimlipatam 20 miles North of this place; at 4 P. M. on Monday, May 5th, 1851, by the heavy sea and Easterly squalls driving her from her anchors.

Sunset, wind veering gradually to the Northward and cloudy in that quarter.

Friday, May 2nd.—Commences with moderate N. W. winds, and increasing swell from the Eastward. Sky overcast. Bar. 29.80; *Emily.* 29.78.

Midday, a dense horizon and cloudy.

Sunset, similar weather. Barometer indicating a slight change. Bar. 29.73.

Saturday, May 3rd.—Fresh N. W. winds with thick hazy weather.

Noon, wind veering to N. and N. E. and threatening appearances in that quarter with drizzling rain. A high sea tumbling in from Eastward. Bar. A. M. 29.72; Noon 29.69.

Sunset, sharp squalls and heavy rain from N. E. Sea increasing.

Sunday, May 4th.—Baffling winds from N. E. to East without any increase. Weather assuming thick and gloomy appearances. Bar. 29.78; Sunset 29.75 and 29.64.

Sunset, ditto weather. Wind drawing round to the E. S. E. in heavy squalls and much rain, with intermittent lulls.

Monday, May 5th.—Winds from S. E. in hard squalls with heavy rain and thick dark weather. The sea all this day running fearfully high, and surf breaking as far as the eye could see. Bar. 29.75 and 29.68.

Sunset, wind Southerly with dense black clouds overhead, and heavy rain throughout the night.

Tuesday, May 6th.—Winds S. and S. W Weather clearing up and a moderating confused sea. Bar. 29.80.

We have not had our usual strong S. S. W. winds, or as termed *along shore* Winds, in the month of April. The two days before the gale, I, as well as others, observed that the atmosphere was unusually clear; not a cloud was seen in the heavens. Stars at night very bright, beautifully clear horizon, a dark blue smooth sea, and the distant hills around appeared clear and brighter than usual to the eye. This strange and sudden change of fine weather for this season, from my long experience on this coast, I have invariably found the forerunner of a storm.

Abstract of the Log of the Barque Paragon, Capt. ———; from Masulipatam to Vizagapatam. Civil Time.

May 3rd, 1851.—A. M. squally from N. E. b. E. Ship working to the N. East. Noon strong gales with thick cloudy weather. Lat. 17° 00′ North; Long. by Acct. 83° 15′ East; 3 P. M. Bar 29.67; Symp. 29.66; making all snug, gale increasing to Midnight, when Bar. 29.66.

AT MADRAS.

The following are the various documents forwarded to me by Capt. Biden or published by him in the newspapers and abridged to suit our purpose where necessary. The Cyclone was felt only as a severe Northerly, N. Westerly, Westerly and South Westerly gale at Madras, but of sufficient severity and menacing appearance to order all the ships to sea from the roads.

"Sunday afternoon, the 4th May, became more squally than we have already described this morning, and the glass showed a downward tendency throughout; although, with us at any rate, it did not fall rapidly till after one A. M. on Monday the 5th, between which and 4 o'clock it reached its lowest depression, 29.110. Soon after 3, the wind began to blow in violent gusts, increasing to a gale as day drew on. At the Observatory, its greatest force was between 8 and 9 o'clock A. M., but it appeared most violent with us, and certainly did all the mischief done, some time before that. This, however, was at a distance of five miles from the Observatory, and judging from the much greater damage sustained in our neighbourhood, as regards the levelling and rending of trees, the stripping of hedges, the mutilating and killing of birds, &c., we should infer that the wind was stronger, as well as earlier in its visit to us, than at the spot of official observation. This remark applies indeed to the Presidency generally, where only the gardens seem to have suffered.

"The amount of rain that fell during Sunday night and Monday morning, was very great for the time of year. Below we give the Observatory record, but whether it indicates as much as fell in parts to the North West of Madras, since the country was far more flooded than we have before seen it after a similar amount of fall.

	Rain,	Wind.	
	Inches.	Direction and Force.	
May 2nd—	0.298	N. N. E.	Gentle breeze.
„ 3rd—	3.822	N. by E.	Fresh breeze.
„ 4th—	2.890	N. N. W.	Strong breeze.
„ 5th—	11.445	S. by W.	Squall and gale.
Total—	18.455		

"At 6 P. M. on the 4th there was a heavy sea on, the rollers breaking amongst the Dhonies and beyond 5 fathoms, and the surf had much increased—whilst a rapid scud and other threatening indications seemed to be the precursor of a severe gale. The Barometer was then at 29.464 and the wind North."

"*May 4th.*—Brisk gale N. E. b. E with lightning in the S E. At 2. 30, Bar. 29.60; 6 A. M. Wind E. b. N. Noon *more moderate*, with a heavy rolling sea. Lat. 16° 24′ North; Long. 83° 26′ E.: Bar. 29.68. P. M. wind E. b. N. gale increasing and a high sea running in all directions. At 10h. 30′ P. M. wind chopped to S. East. Midnight moderating.

"*May 5th.*—A. M. strong breezes S. E. with a heavy sea from South; 2 P. M. Bar. 29.70. Noon moderating Lat. 16° 41′ North; Long. 84° 18′ East.

"Twelve native vessels (Brigs and Dhonies) were said to be missing, and the Barometer on this day, 5th May at 5 P. M. is stated to have been at 29.53, the wind South and the sea much fallen."

"*Extraordinary Observations of the Standard Barometer at Madras, 2nd and 4th May*, 1851.

Date.	Time.	Bar. uncorrected.	Ther.	Wind.	Date.	Time.	Bar. uncorrected.	Ther.	Wind.
Friday,	A. M.					P. M.			
May	h. m.				May	h. m.			
2nd,	8 41	29.808	85.0	N. E.	2nd.	41	29.723		N. b. E.
1851.	9 41	790	85.0	North.		51	723		
	51	788	85.0			3 1	714		
	10 1	792	85.0			11	712		
	11	794				21	712		
	21	796				31	706		
	31	790				41	702		N. N. W.
	41	794	85.5	N. N. E.		51	700		
	51	790				4 1	700		
	11 1	786				11	700		
	11	790				21	704		
	21	796				31	710		
	31	800	85 0			41	716		N. b. E.
	41	788		East.		51	704		
	51	784				5 1	710		
	0 1	777				11	700		
	11	770				21	696		
	21	774				31	690		
	31	776				41	686		N. b. W.
	41	792	83.0	North.		51	684		
	51	796				6 1	688		
	55	803				11	694		
	1 1	782				21	694		
	5	761				31	696		
	11	758				41	698		N. b. W.
	21	746				51	702		
	31	734				7 1	704		
	41	730		N. b. E.		11	710		
	1 51	730				21	720		
	2 1	732				31	720		
	P. M.					41	722		N. b. W.
	2 11	728				51	724		
	21	723				8 1	725		
	31	720				11	725		

Date.	Time.	Bar. uncorrected.	Ther.	Wind.
Friday,	P. M.			
May	h. m.			
2nd,	7 21	29.722		
1851.	31	718		
	41	724		North.
	51	724		
	9 1	727		
	11	731		
	21	732		
	31	734		
	41	736		North.
	51	733		
	10 1	736		
	11	738		
	21	740		
	31	740		
	41	737		N. E.
	51	736		
	11 1	731		
	11	727		
	21	720		
	31	716		
	41	712		N. E.
	51	710		
Satur-	A. M.			
day,	0 1	29.712		N. b. E.
May 3rd,	11	708		
1851.	21	704		
	31	705		
	41	703		
	1 11	683		
	21	680		
	31	675		
	41	670		N. b. E.
	51	664		
	2 1	652		
	11	651		
	21	644		
	31	644		
	41	640		N. W.
	3 1	630		
	11	627		
	21	618		
	31	620		
	41	624		N. W.
	51	638		
	4 1	630		
	11	631		
	21	632		
	31	634		
	41	628		N. b. W.
	51	630		
	5 1	630		
	11	626		
	21	638		
	31	634		
	41	630		N. b. E.

Date.	Time.	Bar. uncorrected.	Ther.	Wind.
	A. M.			
May 3rd.	5 51	29.620		
	6 1	628		
	11	631		
	21	638		
	31	644		
	41	642		N. N. E.
	51	650		
	7 1	654		
	11	662		
	21	667		
	31	664		
	41	670		North.
	51	672		
	8 1	672		
	11	668		
	21	676		
	31	680		
	41	676		North.
	51	680		
	9 1	686		
	11	686		
	21	696		
	31	691		
	41	685		N. b. E.
	51	686		
	10 1	700		
	11	702		
	21	697		
	31	678		
	41	680		N. N. E.
	51	678		
	11 1	672		
	11	656		
	21	660		
	31	664		
	41	654		
	51	654		
	P. M.			
	0 1	654		
	11	652		
	21	640		
	31	641		
	41	632		
	51	630		
	1 1	622		
	11	624		N. N. E.
	21	616		North.
	31	610		
	41	608		N. N. E.
	51	600		North.
	2 1	597		
	11	591		
	21	587		North.
	31	583		
	41	586		North.
	51	581		N. N. E.
	3 1	574		N. N. W.

Date.	Time.	Bar. uncor. rected.	Ther.	Wind.
	P. M. h m.			
May 3rd,	3 11	29 568		N. N. W.
	21	580		N. N. E.
	31	582		North.
	41	578		North.
	51	576		
	4 1	570		
	11	568		
	21	574		
	31	576		
	41	580		N. E. b. N.
	51	580		
	5 1	580		
	11	584		
	21	586		
	31	590		
	41	598		North.
	51	600		
	6 1	602		
	11	602		
	21	608		
	31	614		
	41	614		N. E. b. N.
	51	616		
	7 1	614		
	11	614		
	21	610		
	31	615		
	41	622		
	51	630		
	8 1	628		
	11	628		
	21	630		
	31	632		
	41	640		N. b. E.
	51	640		
	9 1	643		
	11	645		
	21	646		
	31	646		
	41	646		N. N. E.
	51	647		
	10 1	647		
	11	648		
	21	645		
	31	640		
	41	637		N. N. E.
	51	638		
	11 1	638		
	11	638		
	21	636		
	31	634		
	41	630		North.
	51	620		
	A. M.			
Sunday,	0 1	616		
May 4th,	11	612		
1851.	21	608		
	31	602		

Date.	Time.	Bar. uncor. rected.	Ther.	Wind.
	A. M.			
May 4th,	0 41	29.594		N. b. E.
	51	590		
	1 1	584		
	11	578		
	21	578		
	31	574		
	41	570		N. N. E.
	51	567		
	2 1	562		
	11	560		North.
	21	555		
	31	550		
	41	548		North.
	51	544		
	3 1	540		North.
	11	536		
	21	534		N. b. E.
	31	532		
	41	530		North.
	51	534		
	4 1	540		
	11	540		North.
	21	542		
	31	542		N. b. W.
	41	544		
	51	544		North.
	5 1	546		
	11	548		
	21	545		
	31	544		North.
	41	540		
	51	538		
	6 1	542		
	11	548		North.
	21	544		
	31	546		
	41	547		
	51	556		
	7 1	560		
	11			
	21			
	31			
	41	556		N. N. E.
	51			
	8 1			
	11			
	21			
	31			
	41	570		North.
	51			
	9 1			
	11			
	21			
	41	572		North.
	51			
	10 41	557		N. N. E.
	11 41	549		North.
	P. M.			
	0 41	492		North.
	1 41	470		N. N. E.

Date.	Time.	Bar. uncorrected.	Ther.	Wind.	Date.	Time.	Bar. uncorrected.	Ther.	Wind.
	P. M. h. m.					A. M.			
May 4th,	2 41	29.458		N. N W.	May 5th,	9 21	482		South.
	3 41	448		North.		41	493		South.
	4 41	434		North.		10 21	502		
	5 41	464		North.		41	518		S. E.
	6 41	466		N. N. W.		11 21	542		
	7 41	476		N. N. W.		41	540		S. E.
	8 41	490		N. N. W.		P. M.			
	9 41	454		W. N. W.		0 21	556		
	10 41	464		N. N. W.		41	560		South.
	11 41	406		N. W.		1 21	555		
						41	556		South.
May 5th,	A. M.					2 21	560		
	0 41	400		N. W.		41	560		South.
	1 41	380		W. N. W.		3 21	570		
	2 41	362		W. N. W.		41	570		S. b. W.
	3 41	336		W. S. W.		4 21	582		
	4 41	347		S. W.		41	596		S. b. E.
	5 41	322		S. W.		5 41	626		South.
	6 41	362		S. W.		6 41	662		S. b. E.
	7 41	392		S. W.		7 41	699		South.
	8 41	432		S. W.		8 0	708		South.

Lowest at 5h. 36.—29.316.

	10 A. M.		4 P. M.
	Maximum.	Diff.	Minimum.
2d	—29.800	——	29.684 Diff.
3d	— .702	.098	.568 116
4th	— .593	.109	.432 136

N. B.—On the 2nd and 3rd instant the wind hauled round repeatedly to N. N E. and from 10 P. M. to midnight, on the 2nd it was N. E.; at 11 A. M. on the 3rd the wind was N. N. E.

C. B.

"*Further particulars of the late Gale.*" *Extracts from the Log of the Barque Palm.*

Barque *Palm* slipped May 3d, 6h. 40m. A. M., steered E. S. E. until 2 P. M., going 5 knots. She hove to under close reefed main top sail and mizen stay sail, lying E. N. E. then N. E., North, and N. W.; at 2 P. M. May 5th, blowing very hard with heavy sea and rain, lost our stern boat and had main topsail blown away, noon on same day more moderate, 2 P. M. made sail. May 6th 9 A. M. set main sail, 10.30 made Sadras Hills, and 3.20 anchored in Madras Roads, passed several pieces of wood, apparently teak.

Monday, at 2 A. M., Barometer fell to 28.95, wind W. S. W. blowing a very hard gale, with a tremendous sea on, which broke in over the lee gangway. Captain Norie thinks he was 70 miles S. E. from Madras.

(Signed) J. Norie,
Master of the Barque Palm.

Extracts from the Log of the Barque James Hall.

Saturday, May 3rd, 1851.—At 3.30 P. M., put to sea with the *Sophia* in company under reefed fore sail and main try sail. At 8 P. M. Madras light N. W. in 23 fms. At 10 P. M. light hardly discernible from the deck; N. W. b N. midnight frequent squalls with heavy rain, Barometer 29.61; split the fore top mast staysail.

Sunday, May 4th.—A. M. heavy squalls with a confused sea. Vessel pitching deep with incessant gusts of wind; in main trysail at daylight. At 8 A. M. the Barometer falling fast to 29.50 hauled up the foresail and stowed it, vessel taking heavy lee lurches. The lee quarter boat under water at times; hove the ship to under bare poles. Three sail in company under close reefed topsails. From 1 A. M. to 10 A. M. wind at North; Hd. from E. to E. S. E. Noon heavy gales with drizzling rain and a high sea on, vessel taking heavy lee lurches and the sea making a clean breach over all; Barometer 29.41. From 11 A. M. to 4 P. M. wind at N. N. W. Hd. from E. N. E. to East. At 4 P. M. Barometer 29.38. The gale at its height, from 5 P. M. to 9 P. M. Hd. N. E. to E. N. E. From 10 P. M. to midnight wind at West, Hd. from North to N. N. E. The gale blowing with great fury and heavy incessant gusts at intervals, ship labouring heavy and taking heavy lee lurches. The sea making a clean breach over all, Three sail in company under bare poles, worked the bolts that secure the tiller to the rudder head through. Barometer 29.55.

Monday, May 5th.—From 1 A. M. to 10 A. M. wind at S. W. Hd. from N. W. to W. N. W. Heavy gales and cloudy with rain and incessant gusts and a high sea on, vessel labouring heavy and taking fearful lee lurches. At daylight, 3 sail in company under bare poles, Barometer 29.64. At 8, the weather clearing up; at 11 A. M. the gale moderating; noon, strong gales and cloudy. Barometer 29 66; Latitude by account 11° 0′ N.; Longitude by account 81° 43′ East. P. M. gale decreasing and a high sea on, set mizen and fore topmast staysail at 6 P. M. The weather appearing more settled; at 8, made sail. Steering W. S. W. wind South. Midnight strong breeze and cloudy with a sea on; Barometer 29.84.

Tuesday, May 6th.—Latitude observed 12° 34′ N.; Longitude 80° 56′ East; P. M. steering W. S. W. wind at South fresh breezes and free; at

sunset made sail, sounded 28 fathoms, and came to at 1 P. M. on the 7th, in Madras Roads.

JOHN B. M. HARRIS, *Commander,*
James Hall.

Extracts from the Log of the Ship Duke of Cornwall.

Thursday, May 1st.—Unsettled appearance, Bar. setting to 29.65-75, wind Easterly veering to N. E. and N. N. E. latter part. Moderate cloudy weather.

May 2nd.—Strong breeze to N. N. E.; 11 A. M. signal made to shipping to send down T. G. yards and masts. Bar. 29.70; 8 A. M. falling to midnight 29.50 blowing hard and heavy rain, riding easy but heavy sea on. Midnight strong gales and heavy squall at N. N. E. Bar. 29.50; 3.30 A. M. the same, Bar. 29.48.

May 3rd.—6 A. M. signal made to slip (5 or 6 went) but we could not, having the Barque "*James Hall*" a cable's length to leeward of us and a heavy swell on to E. N. E. wind N. N. E. blowing fearfully in squalls. 8 A. M. Bar. 29.54; Noon 29.50 blowing fearfully in squalls. 3 P. M. Bar. 29.48. "*James Hall*" with 2 anchors down drifted a good distance from us. 4 P. M. Bar. 29.40; slipped, blowing fearfully at N. N. E. and a heavy swell to E. N. E. stood to the S. E. under storm trysails and double reefed fore topsail, our run up to Midnight 44′ true S. E. by E. Midnight Bar. 29.38, blowing hard to North. Head to the Eastward.

Sunday, May 4th.—Midnight strong gales and heavy squalls, heavy sea on, ship labouring and straining much. 2 A. M. Bar. 29.38 wind N. N. W. the tiller broke; got the rudder head jammed in the trunk as quick as we could, but its surging had materially started head of the sternpost, kept the ship to under storm main trysail. 4 A. M. Bar. 29.30. Ship not keeping to well, being obliged to keep the rudder as much amidship as possible, on account of wrenching stern post more—paid the stream Hemp cable over the weather bow, with a long Teak fish spanned at the end of it, and kept to better. 5 A. M. had got a spar lashed on rudder head which helped it a little. 8 A. M. Bar. 29.20; blowing fearfully hard to N. W. and a confused sea on, rising in pyramids and heavy rain; 10 A. M. 29.25 (Noon 29.24; wind W. N. W.); 1 P. M. 29.18; 2 P. M. 29.18 (3 P. M. 29.5 minimum) wind West blowing awfully hard and a continued deluge of rain; 5 P. M. 29.10; 8 P. M. 29.14; wind W. S. W.; Midnight 29 30; wind W. S. W. a deal of lightning since 10 P. M. in the N. N. W. and blowing a fearful hurricane, harder since 10 P. M. than before I think, *and the changes of wind preceded by a lull of* 2 *or* 3 *minutes.* The decks in a deluge of water and shipping tremendous seas, ship in much distress.

May 5th.—2 A. M. Bar. 29.30; wind S. W. Port Tack; 4, 35 S. S. W.; 8, 29.40, trysail; Noon 29.50 South; 4 P. M. 29.55; 6, 29.62.; 10, 29.67. { Until 4 A. M. blowing terrific and a heavy confused sea. 8 A. M. more settled and no rain. Noon a hard squall and cloudy. No observation. Up to this time the drift about 1½ per hour.

2 P. M. more moderate, but blowing a hard gale, wind South; 3 P. M. during the afternoon succeeded in getting a very fair temporary tiller on the rudder head; lying W. S. W. under fore, main and mizen storm trysail. 8 P. M. Lat. from indifferent observation 12° 20′; Long. Jupiter 81° 49′. Midnight fresh gales to South, and more sea on, chiefly to W. No soundings with 75 F.

Tuesday, May 6th.—First part a hard gale to South veering at 4 A. M. to S. S. W. and cloudy with high sea on, it yet breaking over us. Bar. 4 A. M. 29.67; 8 A. M. 29.78; Noon 29.75; 8 A. M. hard gales to S. S. W.; Noon do.; the sea very confused. Obs. Lat. 12° 15′; Long. 81° 15′; 2 P. M. Bar. 29.70; 4 P. M. Bar. 29.70, wind S. S. W. strong but weather fine. 8 P. M. Bar. 29.75, wind S. by W. fresh and fine but sea on. Midnight Bar. 29.70, fresh wind South and fine. No bottom 75 F.

Wednesday, May 7th.—Midnight. Moderate and south and fine, Bar. 29.78. No bottom 70 F. 2 A. M. sounded in 53 F. 3 A. M. 47 F.; 4 A. M. 35; Daylight. Sadras Hills West; 7 A. M. Bar. 29.85. Moderate South winds and fine weather. 10 A. M. St Thomas' Mount N. W. wind Southerly light and fine, Bar. 29 80.

Barque "Slains Castle."

H.	K.	F.	Courses.	Winds.	Remarks—Saturday, May 3rd, civil time.
2			In Madras Roads.	North.	4 A. M. heavy gale with heavy rain and confused sea.
4					
6				N. b. E.	10 squalls increasing prepared for slipping.
8					
10					
12				North.	Noon slipped from anchor, wind N.
2					Heavy rain.
4			Sympieso-meter.		P. M. do. wind; running off shore, E. S. E.
6			29.35 S.	North.	S. E. by E. S. E., S. E. by S. until 6 P. M.
8			29.375		Wind steady at N. hove too.
10				North.	
12			29.30		Midnight same weather in 60 fathoms.

H.	K.	F.	Sympiesometer.	Winds.	Remarks—Sunday, 4th May.
2					A. M. wind beginning to veer to W. in squalls, sea becoming like a boiling pot, vivid lightning accompanying the squalls, but no thunder heard.
4			29.20		
6					
8			29.20		
10			29.20	N. b. W.	Noon, very dark thick weather, wind veering rapidly.
12	11		29.125	N. W. b. N.	
2				N. W. b. W.	3 P. M. terrifically heavy squalls, with thunder and lightning immediately overhead.
4				W. b. N.	
6				W. b. S.	4, beginning to take off, but still blowing very hard.
8			29.325	W. S. W.	
10			29.525		
12			29.55	S. W.	Midnight still moderating.

During the height of the gale it was almost dark like very thick fog. Morning, observed a curious brick-red appearance in the sky.

I should suppose that I was, at the time of the height of the gale, about 100 miles S. E. by E. or S. E. of Madras.

From Midnight of May 4th, until 6 P. M. of May 5th gradually moderating, and sea becoming more regular. I then bore up under close reefed topsails and foresail and stood in to the Westward; my Bar. pumped so much that I could not depend on its indication.

Noon May 6th, made sail and at 4 made Sadras Hills, wind continuing steady from S. W.

May 8th, Noon, Sympiesometer 29.70, having risen since the height of the gale 575.

H. J. ANDREW,
Master of the Barque Slains Castle.

To Captain C. BIDEN,

MY DEAR SIR,—I beg to send you an extract from the Barque *Aztec's* Log Book from the time of slipping from my moorings until my return into the Roads again, and have only to say that during my experience as a Commander for the last twenty-two years, I never experienced the elements to display so much confusion, and to blow with greater violence. Satur-

day May 2nd, Midnight increasing squalls with heavy rain, veered out 100 fathoms of cable, the Barometer standing 29.50, at 6, the signal guns were fired; heavy squalls at intervals, at 7 A. M. slipped from our moorings, and proceeded out to sea, the Barometer still on the decline. May 3rd, at 2 P. M. hove to under close reefed main topsail, Midnight hard gales with incessant squalls, wind due North, Barometer standing 29.20. May 4th, wind from N. N. W to N. W. the gale still increasing, Barometer 29.00 5 P. M. furled the main topsail, the squalls still increasing and the Barometer still on the decline. Midnight the Barometer 28.80. May 5th, a perfect hurricane, wind West and the sea in a full state of illumination from the constant flashes of lightning, awful in the extreme, *I had all my sheep killed from the effects of the lightning;* at 4 A. M. the Barometer commenced to rise and the violence of the gale abated, Barometer 29.0. 8 A. M. the Barometer 29.10, the wind still subsiding, Noon strong winds, Barometer 29.30. May 6th, A. M. the weather still continuing to moderate made all sail for the Roads, the Barometer 29.50; at 6 P. M. came to an anchor in the Roads. During the heaviest of the gale I was in Latitude 12° 20′ N. and Longitude 81° 12′ E.

H. W. WRIGHT,
Barque Aztec.

These remarks represent nautical time.

C. B.

Madras, May 6th, 1851.

Captain C. BIDEN,

MY DEAR SIR,—As you requested, I herewith send you an abstract of my log from slipping in Madras Roads on May 3rd instant, at 7 A. M. having perceived signals to do so from your department.

We proceeded to sea under double reefed topsails and foresail, after parting from 75 fathoms of chain, the wind then N. N. W.; at Noon wind the same, and eventually hove the ship to under a main staysail; at 4 P. M. on the 4th inst. until Midnight of the same date it blew a complete hurricane, the wind having suddenly shifted to W. S. W.; at 8 P. M. with heavy lightning and a turbulent sea at 4h. A. M. of the 5th, wind gradually decreasing and at Noon moderate, made all possible sail and stood in for land, the wind at South and S. S. W.; we had until our arrival again fine weather.

Farthest to the Eastward 81° 59′ E.
Ditto Southward 12° 10′ N.
Barometer during the heaviest of the gale 29.85.

The ship made exeellent weather of it the whole time, splitting the topsail being the only mishap.

JOSEPH SWAN.

Barque Sarah Swan, Madras Roads, May 9th, 1851

May 8th 7h. P. M. Barometer 29.73.
10h. P. M. 29.77.
May 9th 7h. A. M. 29.78.
8h. A. M. 29.80.
11h. A. M. 29.79.

Memo.—As the standard Barometer at the Observatory was at 29.97; at 8 A. M. and the *Sarah Swan* at 29.80 this day .170 may be added to her Barometer when at its Minimum, viz. 28.85 + 17 which would give 29.02. as the indication of her Barometer during the height of the gale.

C. B.

Ship William Fisher, Capt. Jones.

To Captain BIDEN, H. C. S.

SIR,—At 6-30 A. M. of the 3rd instant, having observed and answered your signal to the shipping, I slipped my cable and stood to the Eastward under close reefed topsails, reefed foresail, mizen main trysail, and foretopmast staysail. My Barometer at that time 29.30; at noon, took in the foresail; the squalls at that time very heavy; Barometer 29.20; at 6 P. M. gale still increasing, wind steady at north: and, being then by account in Latitude 12° 52′ North; Long. 80° 54′ East, shortened sail. At 8 P. M. the weather cleared up a little, and, during the night it blew a steady gale from the Northward, Barometer still falling; at Noon of the 4th, Latitude by account 12° 27′ North; Long. 81° 3′ East. Although the squalls at times were violent, accompanied with heavy showers, had it not been for the Barometer, I should have thought the gale nearly ended. At 4 P. M. there was mueh less wind and drawing to the Westward; during the day and night previous, the vessel had not shipped any water, and the decks had been dry fore and aft, except during the short shower; but at this time, the water was perfeetly smooth. Nevertheless the Mercury had fallen to 28.60,—*the sea, though calm, was covered with milky foam, and the horizon was circumscribed with that dense murky haze which almost invariably precedes a heavy storm or hurricane, and which appeared to be closing on every side,* and I took advantage of the lull to see my sails and every thing else well secured. At 6.30 P. M. a heavy gust of wind split the main trysail. It lasted about 20 minutes, and eame without the least warning, and rained in torrents during that time: the wind at N. W.; at 8 A. M. by account Lat. 12° 22′ N.; Long. 81° 14′ E. Ship hove to, under

close reefed main topsail, gale from N. W. b. N. At 8.30, heavy rain, gale increasing; at 9 P. M. another sudden and furious gust literally burst the close reefed main topsail to ribbons, the rain fell in sheeted masses; and at 10 P. M. the thunder and lightning made another addition to the fierce collision of the elements. This lasted without intermission until 2 A. M. of the 5th: the wind had gradually hauled round to the Westward and thence to the S. W.; at that time I wore ship's head to the S. Eastward. By account Latitude 12° 34′; Longitude 81° 18′ E,; at 4 P. M. wind and rain moderated a little, thunder and lightning ceased. Barometer rising; at 8, made sail, &c. Strong gale and cloudy weather;—at Noon, wind at South, more moderate, wore to the Westward; weather cloudy. No observation during the day, but from those obtained during the night and next day, my reckoning must have been very correct. Made the light-house bearing N. W. at noon of the 6th becalmed all the afternoon. The above dates are all civil time, and you will observe that the Mercury in my Barometer ranges much lower than that at your observatory, for which reason I have mentioned the height of mine in the Roads at 6.30 A. M. on the 3rd, The Thermometer during the four days remained nearly stationary at 84°; a number of small land birds were blown on board and easily caught, sometimes several together on the afternoon of the 4th; and I observed several shoals of very large skate on the 3rd and 4th.

W. B. Jones,
Commander, Ship William Fisher.

Madras Roads, May 16th, 1851.

May 4th.—Noon Bar. 29.90; P. M. 2h. 28.80: 4, 28.70; 5, 28.60; 6, 28.70; 6.30 A. M. 28.60;* 7, 28.70; 9, 28.70; 10, 28.80; 12, 28.80.

May 5th.—3 A. M. 28.80; 4, 28.90; 5, 29.00; 8, 29.10; Noon, 29.35.

Extract from the Log of the Ship "Cressy," Capt. Bell. (Civil Time).

Days.	*Hours.*	*Bar.*	*Ther.*	*Winds.*	*Remarks.*
May 3rd,—	2 A. M.	29.60	79°	N. N. W.	At 4.35 signal at Master Attendant's flag to slip and stand to sea; repeated at daylight with red flag and swallow tail and with guns from the Fort.
	4 do.	29.52	79	do.	
	6 do.	29.55	79	do.	
	8 do.	29.52	79	North.	
	10 do.	29.55	80	do.	
	12 do.	29.60	80	do.	
	2 do.	29.53	80	do.	
	4 do.	29.50	80	do.	
	6 do.	29.51	79	N. Easterly.	
	10 do.	29.55	79	do.	

* At the Observatory at 6.41 the Barometer was 29.362.

	12 do.	29.50	79	do.	Slipped our cable at 6.45 under close reefed topsails and reefed foresail and stood away S. E. by E. blowing hard at North.
May 4th,—	2 A. M.	29.40	79	do.	Between 4 and 8 about P. M. on the 4th, wind about W. with furious squalls and heavy rain, a heavy cross sea running constant, quick flashes of lightning all night.
	6 do.	29.40	79	do.	
	10 do.	29.35	79	N. N. W.	
	12 do.	29.24	79	N. W.	
	2 P. M.	29.25	79	do.	
	4 do.	29.15	78	do.	
	6 do	29.10	78	W. N. W.	
	8 do.	29.35	78	do.	
	9 do.	28.98	78	do.	
	10 do.	29.03	78	West.	
	12 do.	29.10	78	do.	
May 5th,—	2 A. M.	29.25	78	do.	
	4 do.	29.34	79	do.	
	6 do.	29.40	79	do.	
	8 do.	29.50	79	S. Westerly.	
	12 do.	29.60	79	South.	
	2 P. M.	29.62	79	South.	
	4 do.	29.65	79	West.	
	6 do.	29.68	79	do.	
	10 do.	29.70	79	S. S. E.	
	12 do.	29.70	79	do.	
May 6th.—	2 A. M.	29.65	79	South.	Returned to the Madras Roads at daylight on the 7th instant.
	4 do.	29.60	79	do.	
	8 do.	29.68	79	do.	
	12 do.	29.75	86	do.	

Extract from the Log Book of the Ship Randolph, Wm. Dale Comr. forwarded by Capt. Biden.

May 3rd, 1851.—At 6.15 A. M. saw the signal at the Master Attendant's flag staff to cut or slip, set the treble reefed topsails and slipped the cable and stood to the E. S. E. Strong breeze to the N. N. E. with hard squalls and heavy rain. At 10 A. M. kept away S. E. the gale increasing with heavy rain. At 6 P. M. hove to on the port tack under close reefed main topsail; Lat. by Acct. 12° 20′ S.; Long. 81° 00′ E. At 7 P. M. the gale increasing with furious squalls, took in the main topsail. Midnight strong gale and heavy sea.

May 4th.—Wind North, blowing a heavy gale with violent squalls and heavy rain lying to under mizen trysail, the sea making from Westward and Bar. falling rapidly. Noon blowing a hurricane with a very high cross turbulent sea and heavy rain and lightning. The ship rolling heavily, her lee rail in the water; Noon Lat. by Acct. 11° 56′ S.; Long. 81° 10′ E. The wind gradually drawing to the Westward. At 2 P. M. a heavy sea

struck the stern and washed away the boat. At 4 P. M. the wind S. W. blowing furiously with a tremendous sea. At 8 P. M. the hurricane abating, the Bar. rising; Midnight strong gale and heavy sea.

May 5th.—A. M. strong gale and high sea with hard squalls and rain at times. At 6 A. M. more moderate, set close reefed topsails; Noon strong gale and Southward and dark cloudy weather. The sea more regular. At 10 P. M. Lat. per Alt. of Jupiter 12° 7′ S.; Midnight fresh gale and clear weather, made sail.

May 6th.—A. M. fresh gale and clear, sea falling fast; at 12.30, brought up in Madras Roads.

State of the Barometer during the Gale.

		Bar.	*Aneroid.*	*Symp.*	*Wind.*
May 3rd,	6.30 A. M., ...	29.60	29.65	....	N. N. E.
,,	Noon, ...	29.52	29.60	29.47	,,
,,	2 P. M.,.....	29.44	29.55	29.40	,,
,,	6 ,, ...	29.44	29.53	29.39	,,
,,	10 ,, ...	29.44	29.52	29.39	,,
,,	Midnight, ...	29.40	29.45	29.35	,,
May 4th,	4 A. M.,.....	29.38	29.40	29.30	North.
,,	8 ,, ...	29.33	29.40	29.30	N. W.
,,	Noon, ...	29.20	29.33	....	W. N. W.
,,	2 P. M.,.....	29.10	29.25		
,,	4 ,, ...	29.25	29.40	....	S. W.
,,	8 ,, ...	29.33	29.50		
,,	Midnight, ...	29.38	29.52		
May 5th,	4 A. M.,.....	29.41	29.55		
,,	8 ,, ...	29.55	29.70	....	Southerly.
,,	Noon, ...	29.62	29.72		
,,	Midnight, ...	29 70	29.80		

Inland Notes by Capt. Biden.

May 5th to 6th.—Vizagapatam—blowing a gale from N. N. E. to S. E. and South.

May 5th to 6th.—Bellary—from 4 P. M. from 5 to 8 A. M. 6th, gale with heavy rain.

May 3rd.—Guntoor—gale from Eastward.

May 3rd to 6th.—Secunderabad—heavy storms of wind but little rain.

May 3rd.—Chingleput—raining heavily till 10 A. M. of 5th, then heavy gale commencing at North and veering to East and South.

Tabular View of the Winds and Weather experienced by the different Ships at Noon each day 30th April to 5th May, 1851.

Date.	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
1851. 30th April.	Diana.	0° 6′	86° 00′	S. W. to West.				
	Hannah.	7 50	82 8	Unsettled weather latterly. Off Ceylon.				
	Mary Ann.	9 49	81 34	Light and variable S. W. to North.	29.67 Aneroid .65	..	84°	Heavy rain at night.
	Sarah.	6 36	93 12	Fresh S. S. W. winds and fine.	....	..	..	Increasing to midnight, when cloudy with heavy squalls.
	Atalanta.	12 45	83 58	Light winds S. S. E. to S. E. with calms.	29.80			
	VIZAGAPATAM.	17 41	83 16	Light airs and sultry weather throughout.	29.80	..	..	Unusually clear weather.
1st May.	Diana.	1 56	86 20	Fresh breezes hard squalls and rain. Westerly increasing latterly.				
	Hannah.	8 40	81 43	Heavy and tremendous squalls W. S. W. and S. W.	....	..	..	Every appearance of a gale.
	H. M. S. Fox.	8 57	81 17	W. b. N. to W. N. W. variable.	29.67 to .74	..	82	Lightning.

Date.	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
1851. 1st May.	Mary Ann.	10° 31′	81° 8′	Variable from Westward and North—rain.	29.60	..	81°	Night dull and oppressive.
	P. and O. Str. Precursor.	5 5	79 3	Strong winds W. b. S. Cloudy and frequent squalls. P. M. W. b. N.	29.70 to .82	..	..	Moderating on the 2nd in 3° 15′ N. 78° 18′ East.
	Joseph Manook.	10 30	81 8	Heavy dark appearance and much rain Wind W. N. W.	29.82 to .72 .78	..	82	Heavy N. W. squalls at Midnight.
	Ostrich.	14 19	82 45	E. N. E. and squally.	29·75	29.82	84	Squally at Midnight.
	Atalanta.	11 34	83 40	Smart squalls A. M. East to N. E. and N. N. W. Noon gloomy to Midnight.	29.76 .66 and .75 to .70	..	..	Winds flying about N. N. W. to E. S. E. at Midnight and lightning. Heavy bank to the Southward.
	Vizagapatam.	17 41	83 16	Light airs N. W. and North to N. E. P. M. Northerly.	29.80 and .85	..	..	Long swell from the Eastward.
2nd May.	Diana.	3 04	87 00	Wind W. b. S. to S. W. terrific squalls and deluge of rain.	....	..	..	Current to the Eastward of 20′ in the 24 hours.
	Hannah.	8 40	81 10	Gale increasing with tremendous squalls and rain. Wind Westerly veering about 2 points. each way.	....	..	..	Hove to.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Symp.	Ther.	Remarks.
1851. 2nd May.	H. M. S. Fox.	10° 0′	81° 38′	A. M. variable N. Noon N. N. W. P. M. hurricane. 8 P. M. W. N. W. to N. W. b. W.	29.67 Noon .60 Mid. .47	..	..	P. M. lying to.
	Mary Ann.	10 38	81 17	Strong gale variable N. N. E. to N. W. heavy rain.	29.52 An. .53	..	82°	Night much heavy thunder and lightning to the Northward, 8 P. M. hove to.
	Joseph Manook.	10 40	81 3	Increasing from North, Noon blowing hard P. M. N. W. b. N.; N. N. W.	29.79 8 .74 P. M. .64 12 .56	..	..	2 P. M. hove to.
	H. C. Str. Hugh Lindsay.	Off Porto Novo and Tranquebar.	..	Threatening from the N. W.	29.69	..	..	Southerly, at anchor at Tranquebar.
	Paumbum Channel.	..	..	9 P. M. hard gale N. N. W.	....	..	..	Wind veering frequently from S. W. to N. N. W.
	Ostrich.	13 10	83 10	8 A. M. East Noon E. N. E.	29.60	29.75	83	Midnight increasing gale and heavy squalls.
	Mary Harrison.	13 41	82 15	N. E. to N. b. W. and N. East.	29.60 to .50 and .40	.. Noon. Mid.	85½ to 83½	Heavy swell from S. E. and threatening appearances.

Date.	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
1851. 2nd May.	Catherine Apcar.	10° 44′	84° 14′	Dark cloudy and variable and calms. 4 P. M. Eastward. Midnight hard squalls Easterly.	29.49 to 29.43	29.20 to 29.18	..	Making preparations for bad weather.
	Atalanta.	10 46	81 41	A. M. squally N. N. W. to East 5 A. M. North 10 North to N. W. P. M. to 6, wind N. N. W. when shift to West.	29.64 to .61 P. M. .55 .51 .56	..	..	10 A. M. scudded to the South and S. S. W. Shift to W. N. W. and West; at 6 P. M. hove to, deluge of rain and scud.
	Vizagapatam.	17 41	83 16	Light N. W. winds Noon dense horizon, P. M. the same.	29.80 and .78	..	..	Increasing swell from the Eastward.
3rd May.	Diana.	4 15	87 05	Fresh gale. Wind W. S. W. to S. W. b. S.	....	..	..	A. M. hove to, Noon moderate, made sail, 8 P. M. heavy gale.
	Hannah.	8 53	82 25	Hard gale from the Westward.	....	..	..	Moderating and towards midnight increasing again.
	H. M. S. Fox.	10 21	82 40	A. M. W. N. W. P. M. W. S. W. and S. W.	29.37 to 29.30 Noon .37 10 P. M. .50	29.20	..	9.45 obliged to bear up. Scudding to the Eastward to Midnight.
	Mary Ann.	....	....	Severe gale, heavy rain and terrific squalls. Wind W. to S. West.	29.30 to Noon .33 Mid. .30	..	..	Hove to throughout. Position not given.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Symp.	Ther.	Remarks.
1851. 3rd May.	Joseph Manook.	Not given.	....	A. M. N. W. blowing hard W. N. W. 9 West, violent gusts. Night W. to W. b. S.	29.48 to 29.44	..	..	5 A. M. but little wind, vessel not steering, heavy, confused sea; 7.30 heavy gust from N. W.
	H. C. Str. Hugh Lindsay.	....	....	Wind N. Westerly: gale.	29.40* to 29.58	..	..	Standing out to sea to Noon when hove to.
	Paumbum Channel.	....	....	S. W. hard gale.				
	Ostrich.	12° 46′	83° 00′	A. M. E. b. N. 8 East, Noon E. N. E. to Midnight.	29.40	29.60	82°	Noon to Midnight continued and increasing squalls, rain and sea.
	Hyderabad.	14 05	83 47	P. M. strong breeze Easterly, 6 P. M. E. S. E.	28.90 to 28.80	..	..	Increasing with confused sea to Midnight. Ship standing to the S. S. W. and S. W.
	Mary Harrison.	13 12	81 28	North to N. N. W. squally weather.	29.38 to 29.30	..	83½	8 P. M. hove to.
	Catherine Apcar.	12 40	83 32	2 A. M. E. S. E. P. M. fresh gale East.	29.33 to 29.29 and 29.50	29.12	..	5 A. M. bore up North, heavy squalls and cloudy but little sea; P. M. fresh gale and hard squalls.
	Atalanta.	Not given.	....	A. M. to Noon hurricane W. S. W. P. M. furious squalls W. S. W.	29.52 .60 .54	..	79	Midnight shifted to S. W.

* Probably an error.

Date.	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
1851. 3rd May.	Vizagapatam.	17° 41′	83° 16′	Fresh N. W. winds. Noon North and N. E. and drizzling rain. Sunset sharp squalls and heavy rain.	29.78 to .72 and .69	..	..	Noon threatening to the N. E., high sea tumbling in from Eastward.
	Paragon.	17 00	83 15	A. M. squally from N. E. b. E. Noon strong gales and thick cloudy weather.	P. M. 29.67 to M. 29.66	29.66	..	Preparing for bad weather.
4th May.	Diana.	4 50	86 50	W. S. W. to S. W. b. S. strong gale.	....	..	..	Ship partly hove to.
	Hannah.	9 00	83 00	Wind S. W. Midnight increasing.	....	..	..	Heavy cross sea.
	H. M. S. Fox.	10 22	84 35	A. M. S. S. W. Noon S. S. W. P. M. South to S. b. W.	29.57 to .70 Mid. .72	..	..	At 8 A. M. hauled up to N. West again.
	Mary Ann.	11 49* Acct.	82 34	Blowing a gale at 8 P. M. S. S. W.	29.38 A. M. .35 Mid. .40	..	82°	At 8 more moderate.
	Joseph Manook.	Not given.	....	Daylight more moderate Wind W. b. S. Midnight South.	29.59 to .73			

* So in MSS. but by the following day's Lat. and the wind, it is evident it should be 10° 49′.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Symp.	Ther.	Remarks.
1851. 4th May.	H. C. Str. Hugh Lindsay.	Not given.	....	Increasing at daylight to Noon. Wind Westerly to S. W.	29.50 to .57	..	..	Hove to moderating towards Midnight.
	Paumbum Channel.	....	....	Gale at S. W.	....	..	..	Heavy sea though sheltered by the islands.
	Ostrich.	13° 4′	82° 21′	A. M. S. East strong gale Noon more moderate 2 E. S. E. Midnight S. E.	29.33	29.39	84°	From 8 P. M. to Midnight increasing.
	Hyderabad.	12 30	82 20	Wind S. E. b. E. from 6 A. M. 4 P. M. hurricane S. E. b. E. to East.	28.74 to 28.70	..	..	Decks swept continually, Wind hauling gradually to the Southward.
	Mary Harrison.	12 41	81 38	A. M. North 8 A. M. N. N. W. 8 P. M. N. W. 10 P. M. S. W.	29.30 to 28.80	..	..	10 P. M. shift to S. W.
	Catherine Apcar.	15 13	82 56	8 A. M. fresh gales E. b. S. Wind E. to E. S. E. 9 P. M. S. East.	....	..	..	11 A. M. a terrific squall.
	Atalanta.	Not given.	....	Noon, less violent gale from S. W. Midnight South and abating.	29.54 to .64 P. M. .64 to .70	..	..	10¼ P. M. Lats. per Jupiter, and Spica give 10.46½.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Symp.	Ther.	Remarks.
1851. 4th May.	VIZAGAPATAM	17° 41′	83° 16′	Baffling winds N. E. to East no increase. Weather thick and gloomy. P. M. drawing to E. S. E. in heavy squalls.	29.78 .75 .64	..	..	Much rain and lulls between the squalls P. M.
	Paragon.	16 24	83 26	Brisk gale N. E. b. E. 6 A. M. E. b. N. P. M. E. b. N. 10.30 S. E.	29.60 to .68	..	..	Lightning in the S. E. moderating at Midnight. Shift to S. E. at 10.30 P. M. High confused sea.
5th May.	Diana.	5 00	86 10	S. W. to S. S. W. strong gale.	....	..	..	Ship hove to for 16 hours since Noon late.
	Hannah.	9 40	81 50*	West 8 P. M. blowing hard.	....	..	..	Moderated about 8 A. M. on the 6th off Nagore.
	H. M. S. Fox.	10 25	83 55	South squally, but clearing up.	29.74 to .80	..	84°	Midnight fair.
	Mary Ann.	10 11	82 20	Moderating but heavy sea.	29.55 A. M. .55	..	84	Noon—made sail.
	Joseph Manook.	10 49	83 35	4 A. M. fresh gales Southerly; Noon South.	29.78 to .86	..	..	Current E. S. E. 160′ since the last observation.
	H. C. Str. Hugh Lindsay.	9 59	81 49	Weather becoming fine.	29.52 to .70			

* MSS. very badly written and possibly an error, H. P.

Date.	*Name of Ship or Station.*	*Lat. N.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
1851. 5th May.	Paumbum Channel.	....	....	S. S. W. a gale but not so violent as before.				
	Ostrich.	14° 54′	82° 37′	A. M. S. S. E. strong gales.	29.26 Noon .60	29.31 .80	83°	6, Moderated and made sail. Midnight—out reefs.
	Hyderabad.	12 50	81 40	Noon hard gales about S. E. b. S. P. M. more moderate.	28.71 to 28.80	..	..	Midnight more settled. On the 6th moderate.
	Mary Harrison.	13 11	81 50	Wind throughout S. S. W. to South.	28.80 to 29.58	..	82 to 83½	4 A. M. heaviest weather; 4.30, abating to a strong gale. On 6th, becoming fine.
	Catherine Apcar.	16 42	84 25	Wind hauling to S. S. E. Noon fresh breeze.	29.67	29.46		
	Atalanta.	10 53	83 34	Moderate and fine.	29.75 to .80	..	..	Confused sea still running at Noon.
	VIZAGAPATAM.	17 41	83 16	Wind S. E. in hard squalls, heavy rain and thick dark weather. Sunset southerly, dense black clouds.	29.75 .68	..	..	Sea running fearfully high, and surf breaking as far as the eye could see. On the 6th clearing up.
	Paragon.	16 41	84 18	Strong breezes S. E. moderating at Noon.	29. 70	..	..	Heavy sea from South.

SUMMARY.

We find that on the 30th April the *Diana*, almost on the Equator, had a fresh S. W. to Westerly monsoon in Long. 87° 00′ East; and that again from the meridian of the Coast of Coromandel to 84° 00′ East and between $6\frac{1}{2}$° to 13° North, the weather was fine with fresh to light and variable winds from the Southward. The Barque *Hannah* only, off the Coast of Ceylon, finds it becoming unsettled towards Midnight.

On the 1st May.—The *Diana* in about 2° North is bringing up a strong Westerly monsoon and from the meridian of Trincomalee (81°) to 84° East and between Trincomalee and 11° North Latitude; the *Hannah, H. M. S. Fox,* the *Mary Ann* and *Joseph Manook* have variable Westerly breezes and squally, but except threatening appearances nothing to indicate a Cyclone. The *Fox's* Barometer was *rising* (if this be not an error?) and that of the *Precursor* Steamer (to the W. S. W. of Ceylon) doing the same. The *Joseph Manook's* Barometer is fluctuating from 29.82 to 29.72 and then to 29.78. The Northernmost vessels of those above-mentioned are the *Mary Ann* and *Joseph Manook* in $10\frac{1}{2}$° North. We have then, a degree farther to the North and $1\frac{1}{2}$ degrees to the Eastward, the *Atalanta* in Lat. $11\frac{1}{2}$°; Long. 83° 40′ and the *Ostrich* in 14° 19′ to 82° 45′ with squally gloomy weather from the E. N. Eastward, the *Atalanta's* Barometer *falling* from 29.76 to 29.70 in the 24 hours. The Easternmost ships have N. N. Westerly airs at times, but there is nothing again in all the records to indicate that a Cyclone had yet commenced in any part of the Bay. We have unfortunately no positions given in the Log of the *Sarah* except those of the 10th, when she was in the neighbourhood of the Nicobars and in 6° 36′ N., and 93° 12′ East; and of the 5th, when she was in 10° 40′ N., Long. 86° 10′ East; having had in these four days a heavy gale rising to a hurricane from S. S. W. and of this we cannot say if it was part of a Cyclone or the monsoon only. Its peculiarity of veering from South to S. W. I shall subsequently remark upon, she must on this day have been about 10° East of *Trincomalee,* and the *Diana* also at about 10° to the S. East had also an increasing monsoon gale from the S. Westward.

On the 2nd May.—We have on this day *H. M. S. Fox*, the *Mary Ann*, *Joseph Manook*, and *Atalanta* all within a short distance of each other, with smart gales and squalls more or less severe (that of *H. M. S. Fox* being of force 9) from N. N. W. to N. b. W. so that we may take the centre of the Cyclone, for it had now formed or *descended* as such, to have been bearing E. N. E. from a point in about the centre of their various positions. I, of course, assume the log of *H. M. S. Fox*, as being a perfectly correct one, but I do not lay down the centre as bearing exactly E. N. E. from her, though she had the wind at noon N. N. W. because it is one of the peculiarities of this Cyclone that the wind throughout is described as fluctuating as much as from four to six points with most of the ships, which I shall subsequently remark upon.

The Cyclone, however, was of very limited extent, for we find the *Catherine Apcar*, the log of which ship is perfectly well kept, at only 150 miles E. N. E. of *H. M. S. Fox*, with variable airs and calms, though the *Hannah*, 80 miles to the S. b. E. of the *Fox*, has an increasing gale with tremendous squalls, and the wind Westerly "varying two points each way."

This estimate, for we can call it nothing better, will place the centre for this day in Lat. 10° 40′ North, Long. 82° 25′ East; but it gives the *Joseph Manook* and *Atalanta* the wind at North, while it is stated to have been N. N. W. by their logs; but then, as will be subsequently adverted to, the winds in this Cyclone appear to have been so unsettled, i. e. to have had so much incurving in the squalls, that it is impossible to lay down any positive centre from them.

On the 3rd May.—We have *H. M. S. Fox*, which ship had been standing to the N. Eastward (that is *into* the heart of the Cyclone,) as much as the gale allowed her, bearing up in a complete hurricane, at 9.45 A. M. to save her masts; and at Noon in Lat. 10° 21′ N., Long. 82° 46′ with the wind marked in the log W. S. W. at Noon, and W. N. W. at 7 P. M., a difference of 4 points in the hour, and it flies back again to W. S. W. at 3 P. M.! Hence we can only take the average of West as representing the wind at Noon, but it was evidently very heavy, and the *Fox* was making very bad weather of it.

The next ship to her, the *Atalanta*, was also close on the South side of the centre, and though she had not the calm, yet her log describes

very remarkable alternations of lulls and gusts. Her position on this day is unfortunately not given, nor have I the detailed log to calculate it from, nor do the *Mary Ann* and *Joseph Manook* give their positions. The *Hugh Lindsay* also gives no position, but she was steaming out to sea with the wind N. W. and the *Hannah*, 87′ miles South of the *Fox*, has a hard gale from the West. The *Joseph Manook* notes in her log a remarkable interval of calm about Noon, which may have been the centre; but her position is not given from the 1st to the 5th, so that we are quite at a loss to say if she really was at the centre, though with the strong Easterly current she experienced this is not impossible.

We have then to the N. N. Eastward of the *Fox* at 120 miles distance, the *Catherine Apcar* and *Ostrich*, with increasing gales from E. b. S. and E. N. E. and hard squalls, the first ship bound to Calcutta bearing up North to run as fast as possible out of the influence of the Cyclone. The *Mary Harrison*, 180 miles to the N. N. W. of the *Fox* and 75 to the Eastward of Madras, having the average of her winds about N. b. W. with squally weather, and at Madras the wind appears to have been variable between N. b. W. and N. N. E. and the weather sufficiently threatening for the ships in the roads to be ordered to sea at daylight.

These various winds do not give any certain position for the centre on the 3rd, but they establish clearly the existence of a Cyclone of irregularly blowing and *vibrating* winds, of which the centre must have been close upon the *Atalanta* and *H. M. S. Fox*, and upon the average parallel of the Southern group of vessels (*Atalanta*, *Fox*, *Joseph Manook*, *Mary Ann* and *Hugh Lindsay*,) and that the *Catherine Apcar*, *Ostrich* and *Hydrabad* were upon its Northern quadrants. The *Mary Harrison* (taking her position as correct) appears to have had her winds influenced by the shore, where indeed the winds on the approach of this Cyclone forcibly remind us of a Mexican *Norte*.

With these considerations, then, I have placed the centre for the 3rd May in Lat. 11° 08′ N.; Long. 82° 18′ East, which will give it a track of 35 miles only to the N. N. E. in the twenty-four hours, but there is nothing extraordinary in the Cyclone's being so nearly stationary for one day, and *H. M. S. Fox* which only made good a course of N. 73° East 71′ miles, still reached only to the meridian of the centre

on the 3rd. The diameter of the Cyclone on this day cannot much have exceeded 220 to 250 miles, but its influence was beginning to be felt at 300 miles to the North by the *Paragon;* at Madras 190′ to the N. W.; and to the N. N. E. by the *Hydrabad* at about the same distance, and though the *Mary Harrison's* N. b. W. gale, (for she was hove to under a close reefed main topsail) is an anomaly, I have marked a circle for the *Hydrabad* and for Madras on this day.

On the 4th of May.—The centre on this day at Noon is perhaps best determined by the position of the *William Fisher,* which ship having slipped from Madras Roads on the 3rd, evidently met the centre at 4 P. M. and her reckoning being evidently most carefully kept (though it is not said if with any allowance for the current which sets so heavily along the coast in these gales), her position is probably nearer the truth than those of the *Mary Harrison, Ostrich* and *Hydrabad,* all of which were evidently close on the borders of the centre. Bearing in mind then that the *Mary Harrison* was probably farther to the S. W. perhaps as far as on the meridian of 81°; and the *William Fisher* also a little farther to the South, we shall not be far wrong if we estimate the centre to have been about due West of the *William Fisher* or in Lat. 12° 30′ N.; and in Long. 81° 50′ East; and that being closely followed up by the monsoon, of which it seems to have been a sort of precursor, the groups of ships to the Southward and S. Eastward of this spot, *Fox, Atalanta, Mary Ann,* and *Hannah* had the winds more Southerly than the exact quadrants of the Cyclone would allow them. The *Sarah* to the Eastward and the *Hannah* and *Diana* to the Southward seem both to have had the monsoon, but to the Northward and North Westward the influence of the Cyclone is seen in the Easterly winds of the *Catherine Apcar* and *Paragon* and at Cocanada.

This position of the centre makes the Cyclone to have travelled up on a course of N. 33°; West 100 miles in the 24 hours, and it agrees very fairly with the probable positions and the winds as stated in the logs of the ships which slipped from Madras Roads, so that it cannot be far wrong.

On the 5th May,—It would appear that on this day about 3 A. M. the Cyclone passed inland a little to the Northward of Madras, where we find the winds to have veered from N. West at Midnight to

W. N. W.; at 2h. 41′ A. M. and W. S. W. at 3h. 41′ A. M. giving us, as a mean, the wind at West (centre due North of Madras)at 3h. 10′ A. M. The Bar. is marked as having reached the minimum of 29.316 at 5h. 36′ A. M.; hence at Noon and no doubt because of the closely following monsoon, we find all the winds between S. E. b. S. and S. W. and we have no inland reports from which even approximately to deduce the position of the centre, if there was one, and it is not at all unlikely, that even the low range of the Pulicat hills over which the Cyclone must have passed was quite sufficient to make its various movements so irregular that but little could safely be set down except from a very considerable number of careful local reports such as are obtained in America or England. I am inclined indeed to think that its action was much disturbed in the neighbourhood of the land on account of the great discharge of lightning which took place with some of the ships.

If we take the centre of the Cyclone to have "landed" some 30 miles due North of Madras at 3 A. M., this will give it a course of N. 56° West, 115 miles for the 15 hours, from the place of the centre on the 4th, and for the 24h. will give 184 miles on the same course to Noon placing the centre in Lat. 14° 12′; Long. 79° 49′ As before remarked this acceleration of rate and change of course on the approach of the Cyclone to land is by no means new to us having been frequently traced before by authentic reports.

I have not thought it necessary to mark on the Chart the runs of the ships from Madras Roads; the positions of one or two for the 4th and 5th are given, being referred to in their logs.

There are some peculiarities in this Cyclone worth remarking upon and the first of these is the remarkable—

Vibration of the Wind.—We find this phenomenon to have occurred not when the ships were close to the centre where the incurving of the wind-spirals (like that of the arrows on the vignette of some of the Charts) is to be expected, but at a considerable distance from the centre and even before we can affirm the Cyclone to have truly commenced, and this again to have occurred with the same ship for several days. Thus taking the ships in the order they are set down in the Summary, we find on the 1st May the ships and winds as follows:—

Ship.	Winds.
Hannah.....	Tremendous squalls from W. and S. Westward.
H. M. S. Fox, 1 P. M. ..	Variable W. b. N. to W. N. W.
Mary Ann, 4 P. M.....	Variable West and North.
Sarah, near the Nicobars, 4 P. M.....	Heavy gusts from South to S. W.
Atalanta, 9 P. M.	Smart squalls, at Sunset, East to N. E. and N. N. W.
MAY 2ND. *Hannah*, 4 P. M.	Wind Westerly (heavy gale) veering about two points each way.
H. M. S. Fox, 7 P. M. ..	Variable from North to W. b. N.; P. M. hurricane.
Mary Ann, 6 P. M.....	Strong gale, very variable from N. N. E. to N. W.
Sarah, 4 P. M.....	Heavy gusts South to S. W.
Mary Harrison, 5 P. M...	N. b. W. to N. East.
Atalanta, 4 P. M.	Heavy gusts North to N. W.
At Paumbaum, 10 P. M...	Gusts from S. W. to N. N. W.

On the 3rd May,—The *Hannah*, *H. M. S. Fox* and the *Joseph Manook* being close in upon the centre seem to have had the wind veering with tolerable steadiness and not vibrating as before.

Sarah, 4 P. M., successive heavy squalls from S. to S. W. are marked.

Atalanta, frequent *lulls* of two to five minutes followed by furious gusts, direction not given.

The ships putting to sea from Madras Roads do not seem to have experienced any vibration of the wind worth noting, and many of those mark it as "steady at North, &c." As upon an average we may say that the centre of the Cyclone passed at about 30 or 40 miles from the whole of these ships, it would appear from this and from what we have extracted above, either that this vibration occurred towards the outskirts of the Cyclone and towards the S. W. where it may have been owing to the heavy monsoon, which was evidently following up the Cyclone, or that it occurred more at its commencement while it was settling down. The fact, however, whatever may have been the cause, is highly worthy of notice amongst other yet unexplained ones.

The Management of the Ships. Those which were at sea scarcely require any comment, their errors, or good management, being so clearly seen from their logs and the Charts. H. M. S. *Fox* seems to have paid most severely for running too far in towards the centre. The ships in Madras Roads, however, furnish very instructive lessons. They all ran out more or less upon a wind, evidently to get an offing, forgetting that in so doing, they were risking the chances of meeting with the centre, by which if dismasted and thrown into the Northern quadrants, or as in the case of the *Runnimede* and *Briton* (12th Memoir; Journal, Vol. XIII.) if involved in it, they might have been carried by it like helpless hulks on shore again. Whereas by steering from a point to two or three points more to the Southward they would rapidly have brought the wind to the Northward and to the Westward of North, so as safely and easily to *run round* the Cyclone and so return to their anchorage without straining a rope-yarn. The direction of the wind and the fall of the Barometer were infallible guides for them.

The Barometric Indications. These are also of very great interest, but as I have already prepared one paper upon them embodying through the aid of our new Science of Cyclonology a discovery which I think will be considered as one of much importance by Meteorologists, and this will probably be followed by another, I will not here anticipate upon what I may have to say in those papers.

An account of the Table used for reducing Barometrical Observations to 32° Farenheit, taken in the Surveyor General's Office, Calcutta. By Bábu RÁDHÁNÁTH SICKDHAR, *chief Computer, Great Trigonometrical Survey of India. Communicated by the Deputy Surveyor General.*

The observed heights of a Barometer taken at different temperatures, before they can be compared with each other, will require reduction to one common temperature. The reduction consists of two parts, one part being due to the dilation of the mercury, and the other to that of the brass scale attached to the Barometer. Both these corrections stand embodied in the following formula.

$$C = B.\ \frac{(t - 32^\circ)\, m - (t - 62^\circ)\, b}{1 + (t - 32^\circ)\, m}$$

C = Sum of the two corrections.

B = Observed height of the Barometer.

t = { Observed temperature of the mercury, and of the brass scale which are assumed to be equal.

m = .000100 Expansion of mercury for 1° of Faht.

b = .0000106 Expansion of brass for 1° of Faht.

32° = Standard temperature of mercury.

62° = Ditto ditto of brass.

The formula for C given above, is the same as that which Col. Boileau makes use of in the computation of his Table XI. referring his readers to p. 67 of Galbraith's Tables Edit. 1834, where he says the formula will be found.* Col. Boileau has given no demonstration of the process. Galbraith may have done so, but as the works of the latter are not within my reach, I have been necessitated to satisfy myself of the truth of the formula by the following investigation.

Now (B—C) is the observed Barometrical height reduced to 32°.

Taking this corrected height and multiplying it by the factor (t—32°) m, there will result the correction due to the expansion of the mercury. This correction therefore is of the following form—(B—C) (t—32°) m, in which the *corrected* height of the Barometer

* Vide p. IX. of Introduction to Boileau's Table 1849.

enters as a factor, because it is that which expanded produces the observed mercurial column B.

In like manner the correction for the dilation of the brass scale will be found to be of the form + B. (t — 62°) b, which is additive, because the mercurial column measured by the expanded scale being B, it would be more, or B + B. (t — 62°) b if the scale remained unaltered by temperature.

Combining the corrections for mercury and brass according to their signs, there will arise the following equation.

$$-C = -(B - C)(t - 32°)\,m + B\,(t - 62°)\,b$$

which solved in the usual manner will give

$$C = B.\frac{(t - 32°)\,m - (t - 62°)\,b}{1 + (t - 32°)\,m}$$

which formula has accordingly been made use of in the computation of the following Table.

The arrangement and use of the Table will be best understood from the following example.

Suppose it is required to compute the correction for Barometer 29·780 inches and Thermometer 83°.3.

The Tabular number for 29.8 Fahrenheit, ...	.145
Alteration for 0°.3 Fahrenheit deduced by the common rule of proportion, ...	.001
Required correction, ...	.146
Observed height of the Barometer, ...	29·780
Height reduced to 32° Fahrenheit, ...	29·634

It will be remembered that the Tabular correction is always *negative*.

Table shewing the correction to be applied to a Barometer with a Brass Scale, extending from the Cistern to the Top of the Mercurial Column, to reduce the Observation to 32° Fahrenheit.

Temperature Fahrenheit.	Observed Heights of the Barometer in Inches.																							
	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4
50°	.054	.054	.054	.055	.055	.055	.055	.055	.056	.056	.056	.056	.056	.057	.057	.057	.057	.057	.058	.058	.058	.058	.058	.058
51	057	057	057	057	057	058	058	058	058	058	059	059	059	059	059	060	060	060	060	060	061	061	061	061
52	059	059	059	060	060	060	060	061	061	061	061	061	062	062	062	062	062	063	063	063	063	063	064	064
53	062	062	062	062	062	063	063	063	063	064	064	064	064	064	065	065	065	065	066	066	066	066	066	067
54	064	064	065	065	065	065	065	066	066	066	066	067	067	067	067	067	068	068	068	068	069	069	069	069
55	067	067	067	067	068	068	068	068	068	069	069	069	069	070	070	070	070	071	071	071	071	072	072	072
56	069	069	070	070	070	070	071	071	071	071	072	072	072	072	073	073	073	073	073	074	074	074	074	075
57	072	072	072	072	073	073	073	073	074	074	074	074	075	075	075	075	076	076	076	076	077	077	077	077
58	074	074	075	075	075	075	076	076	076	076	077	077	077	077	078	078	078	079	079	079	079	080	080	080
59	077	077	077	077	078	078	078	078	079	079	079	080	080	080	080	081	081	081	081	082	082	082	083	083
60	079	079	080	080	080	080	081	081	081	082	082	082	082	083	083	083	084	084	084	084	085	085	085	086
61	082	082	082	082	083	083	083	084	084	084	084	085	085	085	086	086	086	086	087	087	087	088	088	088
62	084	084	085	085	085	086	086	086	086	087	087	087	088	088	088	089	089	089	089	090	090	090	091	091
63	087	087	087	087	088	088	088	089	089	089	090	090	090	091	091	091	091	092	092	092	093	093	093	094
64	089	089	090	090	090	091	091	091	092	092	092	093	093	093	093	094	094	094	095	095	095	096	096	096
65	092	092	092	093	093	093	093	094	094	094	095	095	095	096	096	096	097	097	097	098	098	098	099	099
66	094	094	095	095	095	096	096	096	097	097	097	098	098	098	099	099	099	100	100	100	101	101	101	102
67	097	097	097	098	098	098	099	099	099	100	100	100	101	101	101	102	102	102	103	103	103	104	104	104
68	099	099	100	100	100	101	101	101	102	102	103	103	103	104	104	104	105	105	105	106	106	106	107	107
69	102	102	102	103	103	103	104	104	104	105	105	105	106	106	107	107	107	108	108	108	109	109	109	110
70	104	104	105	105	105	106	106	107	107	107	108	108	108	109	109	110	110	110	111	111	111	112	112	113
71	106	107	107	108	108	108	109	109	110	110	110	111	111	111	112	112	113	113	113	114	114	114	115	115
72	109	109	110	110	111	111	111	112	112	112	113	113	114	114	114	115	115	116	116	116	117	117	118	118
73	111	112	112	113	113	113	114	114	115	115	115	116	116	117	117	117	118	118	119	119	119	120	120	121
74	114	114	115	115	116	116	116	117	117	118	118	118	119	119	120	120	120	121	121	122	122	122	123	123
75	116	117	117	118	118	119	119	119	120	120	121	121	121	122	122	123	123	124	124	124	125	125	126	126
76	119	119	120	120	121	121	121	122	122	123	123	124	124	124	125	125	126	126	127	127	127	128	128	129
77	121	122	122	123	123	124	124	124	125	125	126	126	127	127	127	128	128	129	129	130	130	131	131	131
78	124	124	125	125	126	126	127	127	127	128	128	129	129	130	130	131	131	131	132	132	133	133	134	134
79	126	127	127	128	128	129	129	130	130	130	131	131	132	132	133	133	134	134	135	135	135	136	136	137

Temperature Fahrenheit.	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4
80	.129	.129	.130	.130	.131	.131	.132	.132	.133	.133	.133	.134	.134	.135	.135	.136	.136	.137	.137	.138	.138	.139	.139	.139
81	131	132	132	133	133	134	134	135	135	136	136	137	137	137	138	138	139	139	140	140	141	141	142	142
82	134	134	135	135	136	136	137	137	138	138	139	139	140	140	141	141	141	142	142	143	143	144	144	145
83	136	137	137	138	138	139	139	140	140	141	141	142	142	143	143	144	144	145	145	146	146	147	147	148
84	139	139	140	140	141	141	142	142	143	143	144	144	145	145	146	146	147	147	148	148	149	149	150	150
85	141	142	142	143	143	144	144	145	145	146	146	147	147	148	148	149	149	150	150	151	151	152	152	153
86	144	144	145	145	146	146	147	147	148	148	149	149	150	150	151	151	152	153	153	154	154	155	155	156
87	146	147	147	148	148	149	149	150	150	151	152	152	153	153	154	154	155	155	156	156	157	157	158	158
88	149	149	150	150	151	151	152	152	153	154	154	155	155	156	156	157	157	158	158	159	159	160	160	161
89	151	152	152	153	153	154	154	155	156	156	157	157	158	158	159	159	160	160	161	161	162	163	163	164
90	154	154	155	155	156	156	157	158	158	159	159	160	160	161	161	162	163	163	164	164	165	165	166	166
91	156	157	157	158	158	159	160	160	161	161	162	162	163	163	164	165	165	166	166	167	167	168	168	169
92	159	159	160	160	161	162	162	163	163	164	164	165	165	166	167	167	168	168	169	169	170	171	171	172
93	161	162	162	163	163	164	165	165	166	166	167	168	168	169	169	170	170	171	172	172	173	173	174	174
94	164	164	165	165	166	167	167	168	168	169	169	170	171	171	172	172	173	174	174	175	175	176	176	177
95	166	167	167	168	169	169	170	170	171	171	172	173	173	174	174	175	176	176	177	177	178	179	179	180
96	169	169	170	170	171	172	172	173	173	174	175	175	176	176	177	178	178	179	179	180	181	181	182	182
97	171	172	172	173	174	174	175	175	176	177	177	178	178	179	180	180	181	181	182	183	183	184	185	185
98	174	174	175	175	176	177	177	178	179	179	180	180	181	182	182	183	183	184	185	185	186	187	187	188
99	176	177	177	178	179	179	180	180	181	182	182	183	184	184	185	185	186	187	187	188	189	189	190	190
100	179	179	180	180	181	182	182	183	184	184	185	186	186	187	187	188	189	189	190	191	191	192	193	193
101	181	182	182	183	184	184	185	186	186	187	187	188	189	189	190	191	191	192	193	193	194	195	195	196
102	184	184	185	185	186	187	187	188	189	189	190	191	191	192	193	193	194	195	195	196	197	197	198	199
103	186	187	187	188	189	189	190	191	191	192	193	193	194	195	195	196	197	197	198	199	199	200	201	201
104	188	189	190	190	191	192	192	193	194	194	195	196	197	197	198	199	199	200	201	201	202	203	203	204
105	191	192	192	193	194	194	195	196	196	197	198	198	199	200	200	201	202	202	203	204	205	205	206	207
106	193	194	195	195	196	197	198	198	199	200	200	201	202	202	203	204	204	205	206	206	207	208	209	209
107	196	197	197	198	199	199	200	201	201	202	203	204	204	205	206	206	207	208	208	209	210	211	211	212
108	198	199	200	200	201	202	203	203	204	205	205	206	207	208	208	209	210	210	211	212	212	213	214	215
109	201	202	202	203	204	204	205	206	207	207	208	209	209	210	211	212	212	213	214	214	215	216	217	217
110	203	204	205	205	206	207	208	208	209	210	211	211	212	213	213	214	215	216	216	217	218	218	219	220

Table shewing the correction to be applied to a Barometer with a Brass Scale, extending from the Cistern to the Top of the Mercurial Column, to reduce the observation to 32° Fahrenheit.

Temperature Fahrenheit.	Observed Heights of the Barometer in Inches.											
	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	29.0	29.1	29.2
50°	.054	.054	.054	.055	055	.055	.055	055	.056	.056	.056	056
51	057	057	057	057	057	058	058	058	058	058	059	059
52	059	059	059	060	060	060	060	061	061	061	061	061
53	062	062	062	062	062	063	063	063	063	064	064	064
54	064	064	065	065	065	065	065	066	066	066	066	067
55	067	067	067	067	068	068	068	068	068	069	069	069
56	069	069	070	070	070	070	071	071	071	071	072	072
57	072	072	072	072	073	073	073	073	074	074	074	074
58	074	074	075	075	075	075	076	076	076	076	077	077
59	077	077	077	077	078	078	078	078	079	079	079	080
60	079	079	080	080	080	080	081	081	081	082	082	082
61	082	082	082	082	083	083	083	084	084	084	084	085
62	084	084	085	085	085	086	086	086	086	087	087	087
63	087	087	087	087	088	088	088	089	089	089	090	090
64	089	089	090	090	090	091	091	091	092	092	092	093
65	092	092	092	093	093	093	093	094	094	094	095	095
66	094	094	095	095	095	096	096	096	097	097	097	098
67	097	097	097	098	098	098	099	099	099	000	100	100
68	099	099	100	100	100	001	001	001	002	002	103	103
69	102	102	102	003	103	003	004	004	004	005	105	105
70	104	104	105	105	105	006	006	007	007	007	108	108
71	106	107	107	108	108	008	009	009	010	010	110	111
72	109	109	110	110	111	011	011	012	012	012	113	113
73	111	112	112	113	113	013	014	014	015	015	115	116
74	114	114	115	115	116	016	016	017	017	018	118	118
75	116	117	117	118	118	019	019	019	020	020	121	121
76	119	119	120	120	121	021	021	022	022	023	123	124
77	121	122	122	123	123	024	024	024	025	025	126	126
78	124	124	125	125	126	026	027	027	027	028	128	129
79	126	127	127	128	128	029	029	030	030	030	131	131
80	129	129	130	130	131	031	032	032	033	033	133	134
81	131	132	132	133	133	034	034	035	035	036	136	137
82	134	134	135	135	136	036	037	037	038	038	139	139
83	136	137	137	138	138	039	039	040	040	041	141	142
84	139	139	140	140	141	041	042	042	043	043	144	144
85	141	142	142	143	143	044	044	045	045	046	146	147
86	144	144	145	145	146	046	847	047	048	048	149	149
87	146	147	147	148	148	049	049	050	050	051	152	152
88	149	149	150	150	151	051	052	052	053	054	154	155
89	151	152	152	153	153	054	054	055	056	056	157	157
90	154	154	155	155	156	056	057	058	158	059	159	160
91	156	157	157	158	158	059	060	060	161	061	162	162
92	159	159	160	160	161	062	062	063	163	064	164	165
93	161	162	162	163	163	064	065	065	166	066	167	168
94	164	164	165	165	166	067	067	068	168	069	169	170
95	166	167	167	168	169	069	070	070	171	071	172	173
96	169	169	170	170	171	072	072	073	173	074	175	175
97	171	172	172	173	174	074	075	075	176	077	177	178
98	174	174	175	175	176	077	077	078	179	079	180	180
99	176	177	177	178	179	079	080	080	181	082	182	183
100	179	179	180	180	181	082	082	083	184	084	185	186
101	181	182	182	183	184	084	085	086	186	087	187	188
102	184	184	185	185	186	087	087	088	189	089	190	191
103	186	187	187	188	189	089	090	091	191	092	193	193
104	188	189	190	190	191	092	092	093	194	094	195	196
105	191	192	192	193	194	094	095	096	196	097	198	198
106	193	194	195	195	196	097	098	098	199	200	200	201
107	196	197	197	198	199	099	200	201	201	202	203	204
108	198	199	200	200	201	202	203	203	204	205	205	206
109	201	202	202	203	204	204	205	206	207	207	208	209
110	203	204	205	205	206	207	208	208	209	210	211	211

Table showing the correction to be applied to a Barometer with a Brass Scale, extending from the Cistern to the Top of the Mercurial Column, to reduce the Observation to 32° Fahrenheit.

Temperature Fahrenheit.	Observed Heights of the Barometer in Inches.										
	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4
50°	.056	.057	.057	.057	.057	.057	.058	.058	.058	.058	.058	.058
51	059	059	059	060	060	060	060	060	061	061	061	061
52	062	062	062	062	062	063	063	063	063	063	064	064
53	064	064	065	065	065	065	066	066	066	066	066	067
54	067	067	067	067	068	068	068	068	069	069	069	069
55	069	070	070	070	070	071	071	071	071	072	072	072
56	072	072	073	073	073	073	073	074	074	074	074	075
57	075	075	075	075	076	076	076	076	077	077	077	077
58	077	077	078	078	078	079	079	079	079	080	080	080
59	080	080	080	081	081	081	081	082	082	082	083	083
60	082	083	083	083	084	084	084	084	085	085	085	086
61	085	085	086	086	086	086	087	087	087	088	088	088
62	088	088	088	089	089	089	089	090	090	090	091	091
63	090	091	091	091	091	092	092	092	093	093	093	094
64	093	093	093	094	094	094	095	095	095	096	096	096
65	095	096	096	096	097	097	097	098	098	098	099	099
66	098	098	099	099	099	100	100	100	101	101	101	102
67	101	101	101	102	102	102	103	103	103	104	104	104
68	103	104	104	104	105	105	105	106	106	106	107	107
69	106	106	107	107	107	108	108	108	109	109	109	110
70	108	109	109	110	110	110	111	111	111	112	112	113
71	111	111	112	112	113	113	113	114	114	114	115	115
72	114	114	114	115	115	116	116	116	117	117	118	118
73	116	117	117	117	118	118	119	119	119	120	120	121
74	119	119	120	120	120	121	121	122	122	122	123	123
75	121	122	122	123	123	124	124	124	125	125	126	126
76	124	124	125	125	126	126	127	127	127	128	128	129
77	127	127	127	128	128	129	129	130	130	131	131	131
78	129	130	130	131	131	131	132	132	133	133	134	134
79	132	132	133	133	134	134	135	135	135	136	136	137
80	134	135	135	136	136	137	137	138	138	139	139	139
81	137	137	138	138	139	139	140	140	141	141	142	142
82	140	140	141	141	141	142	142	143	143	144	144	145
83	142	143	143	144	144	145	145	146	146	147	147	148
84	145	145	146	146	147	147	148	148	149	149	150	150
85	147	148	148	149	149	150	150	151	151	152	152	153
86	150	150	151	151	152	153	153	154	154	155	155	156
87	153	153	154	154	155	155	156	156	157	157	158	158
88	155	156	156	157	157	158	158	159	159	160	160	161
89	158	158	159	159	160	160	161	161	162	163	163	164
90	160	161	161	162	163	163	164	164	165	165	166	166
91	163	163	164	165	165	166	166	167	167	168	168	169
92	165	166	167	167	168	168	169	169	170	171	171	172
93	168	169	169	170	170	171	172	172	173	173	174	174
94	171	171	172	172	173	174	174	175	175	176	176	177
95	173	174	174	175	176	176	177	177	178	179	179	180
96	176	176	177	178	178	179	179	180	181	181	182	182
97	178	179	180	180	181	181	182	183	183	184	185	185
98	181	182	182	183	183	184	185	185	186	187	187	188
99	184	184	185	185	186	187	187	188	189	189	190	190
100	186	187	187	188	189	189	190	191	191	192	193	193
101	189	189	190	191	191	192	193	193	194	195	195	196
102	191	192	193	193	194	195	195	196	197	197	198	199
103	194	195	195	196	197	197	198	199	199	200	201	201
104	197	197	198	199	199	200	201	201	202	203	203	204
105	199	200	200	201	202	202	203	204	205	205	206	207
106	202	202	203	204	204	205	206	206	207	208	209	209
107	204	205	206	206	207	208	208	209	210	211	211	212
108	207	208	208	209	210	210	211	212	212	213	214	215
109	209	210	211	212	212	213	214	214	215	216	217	217
110	212	213	213	214	215	216	216	217	218	218	219	220

Notes on Dust Whirlwinds and Cyclones. By P. F. H. Baddeley, *Esq., M. D., Bengal Artillery, Lahore.*

(As an Appendix to his last paper,—*ante p.* 264.)

1.—My experience of the smaller dust whirlwinds leads me to believe, that they travel *uninfluenced* by the direction of the prevailing surface wind which may have been blowing prior to their appearance, and indeed, they often come up from an opposite point of the compass.

If they are, as I am certain is the case, *themselves the exciting cause of wind*, the reason of this is obvious.

2.—They rarely deviate materially from their original course, though they commonly progress, more or less, in a wavy line;—now on one side of the path, and now on the other.

3.—They turn indifferently from left to right, or from right to left, and their rotatory motion sometimes seems suddenly reversed—though this may be only an optical illusion.

4.—During strong winds, and in stormy weather, the spiral columns, though in full force, are not easily recognisable, even when passing over a light, dry soil; and would be entirely unnoticed by most persons.

5.—When numerous, they are frequently observed advancing in a line; and after passing the observer, an interval of some minutes may elapse before another set is seen in the distance—and so they continue—one set succeeding another, giving rise to squalls and lulls, or rising and falling of the wind.

6.—Their rate of progression is liable to great variety—being sometimes retarded and then again accelerated, without apparent cause: but in a brisk wind their progress is more uniform.

7.—They appear with great regularity between, though sometimes a little before and after, the hours of 10 A. M. and 4 P. M., increasing in frequency with the heat of the day, and declining as the sun approaches the western horizon:—ceasing altogether before sun-set, when the wind drops.

From the fact of their appearing in greatest numbers during the

hottest hours of the day, it would seem that the solar influence may be considered at least a subordinate cause in bringing them into action.

8.—The winds caused by the passage of whirlwinds, or electro-magnetic spirals through the air, are characterized by gusts or flaws, succeeded by lulls, and are of a totally different description from the winds caused by variations in temperature, or by the rotation of the earth on its axis.

9.—The dust whirlwinds are usually composed of many single spirals joined together; these may separate and reunite again with augmented power.

10.—They preserve a distinct columnar form to the height of three thousand feet and upwards, and terminate in a cloud of dust, which still possesses a gyrating motion, ascending higher and higher.

11.—A dust column or pillar of that height is sometimes observed broken in its ascent into two or three lengthened irregular patches of dust, with perfectly clear intervening spaces; the dust all the while ascending with rapidity into the higher regions, as if the electrically charged pillar were endued at times with an increased centrifugal force.

12.—Their rate of upward ascent is subject to variation, as well as their onward motion.

13.—A lofty dust column, moving slowly, may sometimes be seen to assume, in the course of a few seconds, a wavy, and slightly contorted appearance in its vertical section, while still preserving its exact cylindrical form; the change being effected simultaneously throughout its entire height.

14.—Kites, (which are numerous in this part of the country) often follow the dust whirlwinds for some distance, soaring about and around it, diving at each other, as if in sport; and, seemingly, with no other purpose, than that of enjoyment.

15.—Evaporation is much increased when the whirlwinds are frequent and the wind brisk.

16.—In damp weather, the passage of the electrical spirals over an insulated wire, fails to affect the gold leaf electrometer—and during this humid state of the atmosphere, the electrometer can only be excited with difficulty, and loses power the moment the excitement is removed.

17.—Once, when observing the peculiar motions of a well defined slender dust pillar, rotating briskly, but at the same time remaining almost stationary on the one spot, and while looking upwards at the body of the column, with the view of understanding the particular course the dust was taking in its ascent, the pillar was suddenly withdrawn, or lifted upwards, and carried out of sight—and this occurred so suddenly as to give the impression of its having been divided asunder; particularly as the outer stratum of dust remained for a few moments suspended in the air—but, on again directing the eye to the earth, the absence of the rotatory motion and of the cone of dust, at once explained the real state of the case.

18.—In March last, during unsettled stormy weather, my attention was directed to a large mass of dust whirlwinds to the Northward, moving from West to Eastward—all at once, their course was entirely changed—and they were seen coming back from N. E. to S. W.

This strange and sudden shift, may perhaps be explained, by supposing that the mass of spirals moving in a cycloidal course, recurved at that particular time.

19.—I once followed, for more than a mile, a dust whirlwind of about four or five feet in diameter, travelling at the rate of seven or eight miles an hour, and rotating from right to left ↺. After a time, its progress was retarded, so as to enable me to penetrate to the centre, and to walk slowly with it for a short distance. The centre was perfectly calm, while, round about, the wind was blowing in every direction. Though surrounded by dust, I was enabled, by keeping my eye fixed upon the whirling line of dust at my feet, as it continually swept past me on the right, (the side of progression,) to preserve my position in the central calm space, for some little time, without being inconvenienced by the dust. On the left hand side of the whirl, the dust was not so well defined, but cloudy and confused.

There was in this case, as in all others of a similar kind, a trail of dust closely following, occasioned by the action of the whirlwind upon the air.

20.—Westerly winds, or rather West South West winds, seem almost invariably to prevail at Lahore at the height of three or four miles above the Earth's surface—in the region of Cirro Stratus and Cirrus.

When clouds prevail, with fine weather, they usually clear off about

sun-set, with the greatest regularity, when they are observed progressing Eastward, from the West, with considerable velocity, which would lead to the supposition that, at this height, the prevailing currents, when not disturbed are always in that direction—the same thing is often observed at sun-rise, only *then*, the clouds come up from the West, and continue to increase for a time.

21.—The peculiar manner in which the winds blow after a whirlwind of small diameter and swift progressive motion, is somewhat remarkable, and deserves attention. Plant yourself in the direct line of an advancing whirlwind, and allow it to blow over you. After it has passed, there will generally be perceived more or less of a lull, or the winds blowing in the direction of the track will be found light and unsteady. This may continue for a minute or more, by which time the whirlwind may have travelled onwards 150 or 200 yards. All at once, the breeze freshens and blows steadily and with increased force for a lengthened period; after which, it may drop and then again revive for a shorter period, becoming again unsteady, and by degrees fainter, and then ceasing altogether. Though I have frequently remarked the fact, I am not prepared to account for it, further than to remark, that the light unsteady winds at first may be occasioned by eddies caused by the rotatory action of the whirlwind on the air more immediately adjacent, while the stronger winds may be the oblique currents on either side of the track, meeting on the line, and combining to produce increased power and velocity.

More exact observations however are requisite to enable one acquainted with the theory of the motion of fluids to determine the real cause of this striking phenomenon.

22.—When whirlwinds are moving about, white patches of Cirro-Cumuli are frequently seen on the clear blue sky, exactly resembling flakes of teaseled cotton—having a rotatory motion throughout—forming, and then rapidly dissolving, or ascending with whirling motions into the higher regions, becoming more and more faint as they recede from the sight.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL.

FOR APRIL, 1852.

The usual monthly meeting of the Society was held on Wednesday the 17th instant, at half-past 8 P. M.

1. SIR JAMES COLVILE, *President*, in the Chair.

In the absence of Dr. Sprenger, the Secretary, on public business, Mr. Beadon undertook to officiate for him.

The Proceedings of the last meeting having been read, and an alteration in the note quoad Mr. Bayley's letter having been adopted, the former were confirmed.

Read a letter from Capt. Layard forwarding for exhibition seven silver and twenty copper coins, found in and about Gour. The following is an extract from Capt. Layard's letter :—

" During my late visit to the ruins of Gour, and her sister city—Pandooa or Parwa, in January and February last, my particular enquiries were directed to the procuring of such coins, gold, silver and copper, as are occasionally dug up by brick-diggers in their search for material for constructing houses at Malda and the surrounding bazars. Knowing the dread these people have of allowing any one to suppose them possessed of treasure, I was cautious in my search. The rewards of my labours have been the few copper coins, twenty in number, which I now send you. For the seven silver coins accompanying, I am indebted to Mr. Gray of Goamutty Factory, who most kindly allowed me to select them from duplicates in his possession. This gentleman has upwards of a hundred silver coins, collected during his residence in Gour, and intends, I believe, submitting them some day for identification to the Asiatic Society.

" The coins, principally of silver found in Gour, are very numerous, but I regret to say, so little numismatic taste or historical enquiry, apparently, exists amongst the resident planters and others in the district, that old coins, which have been brought to them by ryots in exchange for the new ones, and which might have led to important dates in the history of by-gone ages, have not only been melted down into ornaments and jewellery of different kinds, but fashioned up into tea-pots and shaving mugs.

" The accompanying silver coins were all found in Mussulman-Gour, and, I should say, may easily be deciphered with the assistance of Mr. Laidley's key to the coins of the kings of Bengal, published in one of the numbers of the Journal, which I have not by me to refer to.

" No. 1, appears, by its Sanscrit legends surrounded by the Arabic characters, to belong to one of the Delhi Emperors : the rest from No. 2 to No. 7, seem to be of Hussein Shah and his son and successor Nusserit Shah.

" I have used above, the expression Mussulman-Gour, in contradistinction to Hindu-Gour, which I feel inclined to think commenced a few miles to the North of the existing high bunds or ramparts at a village called Gungerampore, bordered by the Kalindra River : from thence I procured the copper coins from No. 1 to No. 12 in packet A.

" The tide of Mussulman robbery and spoliation seems to have rolled southwards from Gungerampore to a nullah near the village of Púkeria, carrying with it the deseerated ruins of many noble Hindu temples and palaces, to raise mosques and shrines dedicated to the iconoclastic bigotry and intolerance of the religion of the Prophet.

" Of Hindu-Gour as a city, nothing remains above ground."

List of Silver Coins (7).

No. 1st. Delhi Emperor—date A. M. 962 ?
,, 2nd. Hussein Shah (?)
,, 3rd. Date A. H. 794 temple Jelalloddeen (?)
,, 4th. Nusserit Shah (?)
,, 5th. Hussein Shah (?)
,, 6th. Ditto (?)
,, 7th. Same as No. 5th.

List of Copper Coins found at Gungarampore, Packet A, (12)

No. 1st. Fuekeerooddeen (?) 742.

,, 2nd, 3rd, 4th. (?)

,, 5th and 6th. Doubtful as to antiquity, but found in the foundation of a house.

,, 7th and 8th. Ditto.

,, 9th and 10th. Ditto.

,, 11th. A Gorruckpore coin I think.

,, 12th. I doubt this being a coin, but it was found on the site of Rajah Adisur's palaee.

Eight Copper Coins found at Pandooa or Parwa.

A copy of the Magnetical and Meteorological Observations made at the Bombay Observatory, was presented by Lieut. O. F. P. Fergusson, Superintendent of the Observatory.

Lieut. W. Lees, duly proposed and seconded at the last meeting, was balloted for, and elected an ordinary member.

The Council submitted the following reply from the Under-Secretary to the Government of Bengal to the Society's application to be exempt from paying ground rent for their premises :—

From the Under-Secretary to the Government of Bengal,
To Dr. A. Sprenger,
Secretary to the Asiatic Society.
Dated, Fort William, 11th March, 1852.

Sir,—With reference to your letter of the 2nd ultimo, I am directed by the Most Noble the Governor of Bengal to state that His Lordship has been pleased to exempt the Society from the payment of the ground-rent of their premises, so long as it is occupied by them. The Board of Revenue have been informed accordingly.

I have the honor to be,
Sir,
Your most obedient Servant,
(Signed) W. Seton Karr,
Under-Secretary to the Government of Bengal.

The President stated that at a meeting of the Council held on the 3rd instant, it has been resolved that Mr. Arthur Grote having, at the solicitation of Dr. Sprenger, kindly intimated his willingness to

undertake the duties of Joint-Secretary, the Council do recommend the appointment of Mr. Grote as Joint-Secretary to the next meeting; and then proposed that the recommendation of the Council be adopted. Mr. Colvin having seconded the motion, it was carried unanimously.

Mr. B. H. Hodgson of Darjeling communicated, through the President, two valuable papers on Trans-Himalayan Philology; one entitled, "Comparison and Analysis of Caucasian and Mongolian Vocables," and the other, "Sifan and Horsok Vocabularies, with another special exposition of the wide range of Mongolian affinities, and remarks on the lingual and physical characteristics of the family;" (with a sketch portrait). Ordered for publication in the Journal.

Mr. A. R. Young, Under-Secretary to the Government of India, by order of the Most Noble the Governor-General, submitted for the inspection of the Society thirty-two ancient gold coins found at Benares, together with a descriptive list of the same by Major Kittoe.

After a desultory conversation regarding these coins, it was resolved that drawings of such of them as are unknown be made for publication in the Journal.

Read a letter from Capt. Layard, enclosing fac-similes of Arabic inscriptions on the ruined mosque of Gour. Referred to the Council for examination and report.

Read letters from Professors Fleischer of Leipzig and Wiedmann of Munich, acknowledging the receipt of books sent to the German Asiatic Society and the Royal Academy of Bavaria respectively, and announcing despatch of certain publications.

Read a letter from Mr. Tottie, the Swedish Norwegian Consul in London, announcing despatch of a box of books from the Royal University of Christiania.

Mr. Houstoun having drawn attention to a communication from him to the Chairman of the preceding meeting respecting the publication of the Hayat ul Haywan in the Bibliotheca Indica, the Chairman stated in behalf of the Council, that the Society having sanctioned the publication of this work, the Council has not the power if it had the inclination, to interfere; and that Mr. H. was in error, in supposing that three Arabic works are in the course of publication.

The Curators and the Librarian having submitted their usual monthly reports, the meeting adjourned.

Report of Curator, Zoological Department.

Sir,—My Report for to-day records the donations received during the last four months, which are as follow:—

1. From A. Campbell, Esq. Darjiling. Skin, in winter *pelage*, with fine horns and hoofs complete, of the great Asiatic Stag, which I feel satisfied is the Cervus Wallichii, Duvaucel. This noble animal is the Tibetan *C. affinis* of Mr. Hodgson, and there is scarcely a doubt of its identity with the Stag of Kashmir *(C. cashmirensis*, Falconer, *MS.*, apud Gray), and little that it will prove to be the same as that of northern China, and as the *Irbisch* or great Stag of Siberia mentioned by Strahlenberg and Pennant.* It may possibly also be the Persian *Maral;* though our impression is that the latter is more nearly affined to C. elaphus, as the present species is to C. canadensis (v. *strongyloceros*, *occidentalis*, &c.)† It, however, is a distinct species from C. canadensis; and most decidedly it is that well figured in Mons. F. Cuvier's work by the name C. Wallichii, approximated by me to C. canadensis in *J. A. S.* X, 745. In Mr. Vigne's portfolio of drawings made in Kashmir and Little Tibet, was a careful figure of this animal in its summer *pelage*, taken from a captive individual in Kashmir; and this was bright rufous, like the

* "Stags are totally extirpated in Russia, but abound in the mountainous southern tract of Siberia, where they grow to a size far superior to what is known in Europe. The height of a grown hind is four feet nine inches and a half, its length eight feet, and that of its head one foot eight inches and a half." Pennant's 'Arctic Zoology,' p. 31. Strahlenberg distinguishes the *Irbisch*, or great Stag, from the *Isubrissen*, or common Stag, of Siberia. Like Equus hemionus, Ovis ammon, and other species, it doubtless ranges from Southern Siberia to Tibet, &c.

† Since the above was in print, we have seen Mr. Gray's paper on the Cervidæ, read before the Zoological Society and re-published from its 'Proceedings' in *Ann. Mag. N. H.*, 2d series, IX, 413, (May, 1852). We see nought in it to modify our opinion regarding Cervus Wallichii. Mr. Gray may rest assured that there is no cis-Himalayan (or sál-forest) stag of the Elaphine type (vide also Hodgson, in *J. A. S.* XX, 392): and when he refers to C. Wallichii as "the Stag of India," he uses the term *India* in a most vague and latitudinarian sense, which cannot be conceded; it is little better when he refers even to C. frontatis as an *Indian* animal. Mr. Gray pronounces the Persian *Maral* to be identical with C. Wallichii. We only saw a living mature hind, and a young stag of the third (?) year,—an antler of which is figured in *J. A. S.* X, 750, pl. fig. 10. In size and colour the *Maral* would certainly seem to accord sufficiently with C. Wallichii; and Mr. Gray is probably right in identifying them, however remarkable the range of climate, which indeed is considerable also, with C. canadensis and even C. elaphus.

corresponding garb of the Wapiti, and of many other species of Deer (*e. g.* C. DUVAUCELEI of India): but the winter dress of the great Asiatic Stag is strikingly different from that of the Wapiti or great Stag of N. America—which has the upper parts very much paler, contrasting with darker limbs and belly. I cannot trace, also, the least appearance of the throat-beard conspicuous in an old male Wapiti; the tines of the antlers, I think, are shorter than is usual in that species; and there seems no tendency to the formation, in any specimen yet observed, of a small additional snag near the inner base of the first basal tine (or 'brow-antler'), which in large Wapiti horns is of frequent occurrence (Vide X, 750, pl., figs. 3, 5, 6). The horn figured in Vol. XX, p. 393, pl. VIII, I consider to be that of a young C. WALLICHII: the peculiarity represented being very common in the horns of C. ELAPHUS of corresponding age. The second basal tine (or 'bez-antler') is far more constant in C. CANADENSIS and C. WALLICHII than in C. ELAPHUS, which last very commonly wants it (especially when young), as *constantly* in C. BARBARUS; the horn of which latter species, again, is precisely that of C. DAMA (or the Fallow Deer), but with a true elaphine bifid or trifid crown instead of the palmation.* The whole of these, with the less affined (but mutually allied) TARANDUS and (extinct) MEGACEROS, constitute a series of forms wholly distinct from all other Deer, whether of America, S. E. Asia, or the Roes of Europe and N. Asia, which last have most affinity for American types. The possession of the median tine (or 'royal antler') is a characteristic distinction of this entire great Elaphine series as here indicated (with rare individual exceptions), being met with in no other Deer; and these animals are also conspicuously longer-bodied than other Deer, and have a different and distinct carriage. My impression is,—having seen several fine living examples of C. CANADENSIS, having studied them attentively at all seasons, and

* In what does C BARBARUS differ from the Corsican Stag figured by Buffon, and from the Stag of Greece (original Ελαφος), which I am informed is similar and distinct from C. ELAPHUS of modern zoologists? I have several careful figures of the Barbary Stag, male and female, drawn from first-rate specimens in the Zoological Society's Garden. The species is further remarkable for the comparative shortness of the limbs, and the enormously tumid larynx of the male during the rutting season. The stag of the Appenines is true C. ELAPHUS.

superintended the execution of sundry drawings that were taken of them with extreme care and the minutest attention to detail, whereby I happen to be particularly familiar with the character of the species,—that this great American Stag will be found to average a larger size than the Asian C. WALLICHII, if not to be constantly larger. They are, however, most closely affined, even more so than OVIS AMMON and O. MONTANA.

2. From Mr. A. Hancock, of Newcastle-upon-Tyne, I have received a collection of sundries, of which I make over to the museum skins of MELES TAXUS, NOCTULINIA NOCTULA (2.), TINNUNCULUS ÆSALON (2.), EUDROMIA MORINELLUS (young), TOTANUS GLOTTIS (2., British specimens *perfectly identical* with the Indian *glottoides* of Vigors), LARUS MARINUS (adult), OIDEMIA FUSCA (male), and PODICEPS CORNUTUS (crested). Also a series of antlers (not fine) of CERVUS ELAPHUS, and two fine frontlets of C. CAPREOLUS; with examples in spirit of British Vipers, Frogs, and a few Insects. I further present the Society with the following specimens from Darjiling.—Skins respectively of LASIURUS PEARSONII, Horsfield *(J. A. S.* XX, 524),* TALPA MICROURA, HYSTRIX HODGSONII, AQUILA IMPERIALIS (in uniformly brown plumage), TCHITREA PARADISI (fine parti-coloured male, killed in L. Bengal), SITTA CASTANEOVENTRIS, and the young of ATHENE BRAMA, PSILORHINUS FLAVIROSTRIS, CORACIAS INDICA, and PARUS CINEREUS. Also the carcass of an adult male ARCTONYX COLLARIS, both skin and skeleton of which have been prepared,—and a female MELANOCORYPHA TORQUATA, nobis, *J. A. S.* XIII, 962, XVI, 476.

3. From the Rev. F. Fitzgerald, a collection of mammalia, birds, reptiles, &c., from N. Carolina.

Of Mammalia are sent FELIS RUFA, Guld.; a skull; MUSTELA FUSCA, Bachman, 2 skins; PROCYON LOTOR, (L.), skull; SCALOPS AQUATICUS, (L.), in spirit; SCIUROPTERA VOLUCELLA, (L.), skeleton; SCIURUS LEUCOTIS, Gappar (v. *cinereus*, Harlan, et *carolinensis*, Godman), skin; and MUS MUSCULUS, L., two skins.

Of Birds, skins of TINNUNCULUS SPARVERIUS, fœm.; BUTEO BOREALIS, juv.; BUBO VIRGINIANUS, mas; CERYLE ALCYON, mas; DRYOCOPUS PILEATUS, fœm., and skull of male; PICUS PUBESCENS, mas; COCCYZUS ERYTHROPTHALMOS; CYANURUS CYANEUS; QUIS-

* *Noctulinia lasiura*, Hodgson, *J. A. S.* XVI, 896.

CALUS PURPUREUS (2); AGLAIUS PHŒNICEUS (2); STURNELLA LUDOVICIANA; SPIZELLA PUSILLA; PASSERCULUS SAVANUS (2); CHRYSOMITRIS TRISTIS; CARDINALIS VIRGINIANUS (2); AMPELIS CAROLINENSIS; PROGNE PURPUREA, f.; TYRANNUS CRINITUS; SIALIA WILSONII; MERULA MIGRATORIA; MIMUS RUFUS; TRICHAS MARILANDICA; BUTORIDES VIRESCENS, juv.; CLANGULA GLAUCION, f.; MERGUS SERRATOR, f.;—with skull of NUMENIUS LONGIROSTRIS, and foot of HALIAËTUS LEUCOCEPHALUS.

Of Reptiles, EMYS GUTTATA (shell); STERNOTHERES ODORATUS (3 young, in spirit); CHELYDRA SERPENTINA (shell);—and all the following in spirit—PLESTIODON LATICEPS, PL. FASCIATUS (2); ANOLIUS PRINCIPALIS (2); COLUBER CONSTRICTOR; C. (?)——?; TROPIDONOTUS SIPEDON, (L.) Dekay (*Tr. fasciatus*, Schlegel, adult and young); TR. TÆNIA, Schœpff. (*Col. sertalis?*, L., three specimens): TR. SAURITA, (L.), Schlegel (young; and also young of two other species); HERPETODRYAS GETULUS (L.); H. ÆSTIVUS, (L.), Schlegel (2); H. ——? (2); HETERODON COCCINEUS (*Rhinostoma coccinea*, Holbrook); TRIGONOCEPHALUS CONTORTRIX, (L. 2); CROTALUS DURISSUS; RANA PIPIENS (?), large tadpole; POLYPEDATES (*Hyla viridis* of Holbrook); P. ——?; TRITON MULTIPUNCTATA; TR. NIGER (?); another affined to TR. SALMONEA; and large and small individuals of AMPHIUMA MEANS, Harlan.*

CRUSTACEA. HOMARUS AMERICANUS and ASTACUS BARTONI in spirit. Also a few insects and a SCOLOPENDRA in spirit.

4. From Dr. Kelaart, of the Ceylon Medical Service, several packages have been received, which have greatly enriched our collections.

Of mammalia, we are indebted to him for skins, skulls, &c. of PRESBYTIS PRIAMUS, and skins of PR. URSINUS (*J. A. S.* XX, 155), young, and skin of PR. CEPHALOPTERUS, almost white (*Pr. albinus*, Kelaart, *J. A. S.* XX, 182); LEMUR CATTA, L.; and numerous specimens of Bats, as follow:—

* Certain of the snakes in this collection would appear to be undescribed, for we have been unable to make them out from M. Schlegel's work, and they are neither noticed in Dr. Harlan's "catalogue of North American Reptiliæ," published in the "Journal of the Philadelphia Academy," Vol. V., nor among the "extralimitals" enumerated in Dekay's "Natural History of New York."

Pteropus edulis, *v. Edwardsii*, &c.

Pt. Leschenaultii, Desm., v. *Pt. seminudus*, Kelaart. A fine pair in spirit, a skin, and specimen now prepared as a skeleton.

Cynopterus marginatus, (B. Ham.) Some ordinary brown examples in spirit, and a skin with the neck and sides of a very deep ferruginous hue, in which phase this species is the *C. Horsfieldii* of Mr. Gray. In old Bengal specimens, the same parts become deeply tinged with bright tawney or rufo-fulvous, but are never dark ferruginous, so far as we have seen.* Malayan examples are of a paler and more uniform brown, and constitute the *C. titthœcheilus*, (Tem.), &c. &c. ;† exhibiting no further difference whatever that we can perceive, notwithstanding the remarks of Dr. Horsfield in his recently published catalogue of the specimens of mammalia in the Hon'ble Company's Museum in London.

Nycticejus Temminckii, (Horsfield, nec Rüppell, *Atlas*), v. *Belangeri, castanea*, et *noctulinia*, auct. Two specimens, one paler than the other on the upper parts. By exposure to the light, the fur of this species fades and becomes much more rufous or rufo-fulvous ; and in all Indian specimens that we have seen, the under-parts are constantly much paler than the upper : but in one Javanese example in the Society's collection, the upper-parts are of a much more vivid tawny-rufous or ferruginous colour than we have seen in any Indian specimen, and the under-parts are scarcely fainter in hue. We consider this to be a casual variety only, analogous to those of certain Horse-shoe and various other Bats mentioned in the sequel.‡ *N. B.* Although in the recent state, this very common Indian species is most easy to distinguish from N. luteus, nobis *(J. A. S.* XX, 157), from the considerable difference of colour, however either may vary, they both fade and alter so much in colour by exposure to light that they then appear like larger and smaller races of the same species,—the under-parts of M. luteus, however, becoming generally of a more

* Since writing the above, we have obtained a fresh Calcutta specimen, which at first was very nearly as deeply tinged with ferruginous as the example from Ceylon ; but, in drying, the colour has faded very considerably.

† Vide *J. A. S.* XV, 187.

‡ A similar Javanese specimen is noted in Mr. Gray's Catalogue of the specimens of mammalia in the British Museum.

rufescent hue than those of ordinary N. Temminckii. The length of fore-arm in N. Temminckii is very regularly 2 in., in N. luteus $2\frac{3}{8}$ in., and in N. Heathii $2\frac{3}{4}$ in. Examples of N. Heathii from Ceylon appear to be constantly a good deal darker than those from S. India, unless perhaps from the more proximate districts of the continent.

Scotophilus coromandelianus, (F. Cuv.)

Vespertilio adversus (?), Horsf. Rather darker than a Calcutta specimen referred to the same, which latter entirely resembles an example procured at Penang.

Kerivoula picta, (Pallas).

Megaderma spasma, Geoffroy. A skin and entire specimen in spirit. Identical in species with examples from Malacca and Java.

Rhinolophus affinis (?), Horsfield: *Rh. rubidus* et *fulvidus*, Kelaart, as also another supposed species referred to by the same gentleman in *J. A S.* XX, 182-3; perhaps, too, the doubtfully cited *Rh. pusillus* from Ceylon of Mr. Waterhouse's catalogue of the mammalia in the Zoological Society's museum: but, it would seem, not Rh. affinis of Dr. Cantor's Catalogue of the mammalia inhabiting the Malayan peninsula *(J. A. S.* XV, 181). An extensive series of specimens, both in spirit and skins; and varying in hue from the most vivid rufo-ferruginous in both sexes, to dusky-brown paler below and without a shade of ferruginous or fulvous in either sex,—others again being intermediate,—and one adolescent example is dingy cinereous above, with here and there a slight admixture of rufous, and below chiefly of the latter hue. In structure there is no diversity whatever, and those of various colours were taken in company. The admeasurements of a full grown male are as follow. Length of head and body $2\frac{1}{4}$ in.; of tail (additional) 1 in.; alar expanse $10\frac{1}{2}$ in.; fore-arm $1\frac{7}{8}$ in.; tibia $\frac{7}{8}$ in.; ear conch (posteriorly) barely $\frac{5}{8}$ in. Facial appendages typical. Fur of mean length, somewhat dense, porrect, sinuous. A minute pair of upper incisors, liable to be overlooked, in the fresh specimen.

Hipposideros nobilis (?), Horsfield: *Rhinolophus armiger*, Hodgson; *H. lankadiva*, Kelaart, vide *J. A. S.* XX, 183. Male and female in spirit; another specimen now set up as a skeleton; and a skin. Decidedly identical in species with Mr. Hodgson's *armiger*, and so far as can be judged from the figures and descriptions, also with the Malayan H. nobilis.

H. SPEORIS, (Schneider). Vide *J. A. S.* XIII, 489. Numerous specimens in spirit and also skins. It is remarkable that some examples of this species, also, are very bright rufo-ferruginous or golden-fulvous, others fulvous-brown more or less dark, and others again brown or slaty without a tinge of fulvous,—the ordinary colour (that heretofore described) however predominating, and, in general, it would seem that the brown Ceylon specimens run darker than those of S. India. Moreover, it would seem that the vivid rufous examples both of this and other species are comparatively rare, though from being particularly selected out of multitudes they may accumulate in collections.

H. MURINUS, (Elliot): of which there now can be no further doubt that *Rhinolophus fulgens*, Elliot, v. *H. fulvus*, Gray, is merely the corresponding vivid rufous phase to those noticed of H. SPEORIS and of the RHINOLOPHUS. Four specimens, all of a blackish tint, thus illustrating the *H. ater* of Dr. Templeton, and indicating that in the present species (as in the preceding) Ceylon examples run darker than those of S. India.*

* The observation of these varieties of colour in different Horse-shoe as well as in other genera of Bats shews that colour has been too much regarded in the attempt to discriminate the species of these animals. It is a variation that has long been known in some of the RHINOLOPHI, and M. Geoffroy St. Hilaire was of opinion that the rufous hue becomes more intense in proportion as these animals inhabit nearer the equator. Indeed, this would seem generally to be the case, though the Australian RH. AURANTIACUS of Mr. Gray is stated to rival in the vivid intensity of its colouring the 'Cocks of the rock' (RUPICOLA). Numerous examples of the variation in question may here be conveniently adduced.

RHINOLOPHUS LUCTUS, Tem. (Apparently identical with *Rh. perniger*, Hodgson, inhabiting the S. E. Himalaya and the Khásya hills.) Rufous variety, from Manilla, described by MM. Eydoux and Gervais in the Zoology of the voyage of 'la Favorite.' Perhaps also Mr. Gray's *Rh. morio* from Singapore, the fur described as "reddish brown;" yet in Mr. Gray's catalogue of the specimens of mammalia in the British Museum, he terms this "the Black Horse-shoe Bat," a name suitable enough for ordinary RH. LUCTUS.

RH. MINOR (?), Horsfield. The *Rh. lepidus*, nobis, from Bengal, Masuri, &c., would appear to exemplify the ordinary phase of what we now take to be this species, and *Rh. subbadius*, Hodgson, to represent the rufous phase. At least *Rh. lepidus* and *Rh. subbadius* prove to differ only in colour, and both seem to be referable to RH. MINOR. (Since writing the above, we have observed that Mr. Hodg-

Of *Carnivora*, three species of Mungouste are sent, viz. MUNGOS VITTICOLLIS, (Bennet), injured;—HERPESTES RUBIGINOSUS, Kelaart, v. *Ellioti*, nobis, vide *J. A. S.* XX, 162, 184;—and H. FULVESCENS et *flavidens*, Kelaart, *loc. cit.* Of the two latter, H. RUBIGINOSUS is affined to H. NYULA, Hodgson, in size and the character of its fur, but the rufous ground-tint predominates, the tail-tip is black and the four paws are blackish; and H. FULVESCENS is similarly affined to H. GRISEUS, but is of a much deeper colour, a deep fulvous or tawny predominating, and the coat is more dense, though by no means so full and so developed upon the tail as in H. FUSCUS, Waterhouse, of the Nilgiris. The name *flavidens* is objectionable as being quite unfounded,

son assigns his SUBBADIUS to HIPPOSIDEROS in *J. A. S.* XVI, 896; but the specimens which he sent to the Society by that specific name are genuine RHINOLOPHI.)

RH. MACROTIS, Hodgson. Of this sub-Himalayan species we have both brown and light rufous examples.

RH. AURANTIACUS, Gray. The description of this Australian species is not at hand; but we may suggest that it probably is merely a rufous variety of RH. MEGAPHYLLUS.

HIPPOSIDEROS DIADEMA, (Geoff.) Vide Cantor, in *J. A. S.* XV, 182.

H. LARVATUS, (Horsfield), the rufous phase,—and *Rhinolophus vulgaris*, Horsf., the dark phase. The Arakan species described under these names in *J. A. S.* XIII, 488, appears on present evidence to be correctly assigned.

Taphozous fulvidus, nobis, *J. A. S.* X, 975, is merely a fulvescent phase of T. LONGIMANUS. (*T. brevicaudus*, nobis, also, was founded on a specimen of T. LONGIMANUS distorted by the stuffer; and as *T. crassus*, nobis, proves to be identical with T. SACCOLAIMUS, Tem., v. *pulcher*, Elliot, and as we further are not now satisfied of the distinctness of *T. Cantori*, nobis, from T. LONGIMANUS, the Indian TAPHOZOI would accordingly be reduced to T. SACCOLAIMUS, Tem., T. MELANOPOGON, Tem., and T. LONGIMANUS, (Hardwicke),—all three inhabiting the peninsula of India as well as the countries to the E. and S. E.

NYCTICEJUS TEMMINCKII, (Horsf.), exhibits occasionally an uniform bright tawney-rufous phase of colouring (in the Malay countries only, so far as observed), which has already been remarked in the text.

NYCTICEJUS (small undetermined species, common about Calcutta). The writer once shot a specimen, now in the Society's museum, with patches of bright golden-fulvous on the lower-parts.

CYNOPTERUS MARGINATUS, (B. Ham). Vide text.

Analogous variations occur in sundry birds, which exhibit an occasional rufous or tawney phase of colouring; *e. g.* various CUCULI,—certain Owls (especially the small Indian SCOPS, of which the grey phase was named *Sc. pennata* and the

and we therefore substitute for it the other appellation by which it has also been described.*

LUTRA NAIR, F. Cuv. Specimen procured at an elevation of 4,500 ft., near Newera Elia.

URSUS LABIATUS. Skull of an old female.

SOREX. Two species of typical Shrew, one the S. FERRUGINEUS,

rufous phase *Sc. sunia* by Mr. Hodgson),—some of the Asiatic PODARGI (v. *Batrachostomi*), vide *J. A. S.* XVIII, 806, &c.

* The determination of the above species of Mungouste necessitated a more elaborate study of the various Indian species of the group than we had previously the opportunity of bestowing; and the following are the results arrived at, from the series of specimens now in the Society's museum, among which we discriminate the following:—

1. URVA CANCRIVORA, Hodgson. Hab. Nepal; Arakan; Afghanistan (Griffith).

2. MUNGOS VITTICOLLIS, (Bennet). Hab. Malabar; Ceylon. (*N. B.* Barely separable, generically, from the last, although the bony orbital rings are complete in adults—as in the following species, with the exception of H. BRACHYURUS which is about equally worthy of separation. The black lateral neck-band in the present species is represented by a white one in the preceding).

3. HERPESTES RUBIGINOSUS, Kelaart; *H. Ellioti*, nobis. Hab. S. India; Ceylon.

4. M. MALACCENSIS (?), Fischer: *H. nyula*, Hodgson: *H. griseus* apud nos, passim. Hab. Bengal; Nepal; Arakan? Malayan peninsula? We possess a fine mounted albino of this species, referred to H. GRISEUS in *J. A. S.* XV, 250.

5. H. GRISEUS, (Geoffroy). *Viverra mungo*, L., et *H. pallidus*, Schinz, apud Horsfield. Hab. Hindustan; S. India; Ceylon? *N. B.* Resembles the last in size and form, and H. NIPALENSIS in the character of its fur.

6. H. FULVESCENS, v. *flavidens*, Kelaart. Hab. Ceylon; S. India?

7. H. NIPALENSIS et *auropunctatus*, Hodgson. Hab. Bengal; Upper India generally; Sindh; Afghanistan; Malayan peninsula (Cantor). *N. B.* Varies much in general cast of colour, ashy or fulvous prevailing, some also being very pale, others dark.

8. H. JAVANICUS, (Geoff.) Hab. Malayan peninsula and archipelago, ascending northward to Chittagong. *N. B.* Does not seem to differ from the last except in colour.

9. H. FUSCUS, Waterhouse. Hab. Nilgiris.

10. H. (?) BRACHYURUS, Gray. Hab. Malayan peninsula. *Remark.* The only two species of Mungouste inhabiting Bengal are H. MALACCENSIS? (*nyula*) and H. NIPALENSIS.

Kelaart, *J. A. S.* XX, 185,* (perhaps *S. niger*, Elliot, of Horsfield's Catalogue?): the other sent as the "large godown Shrew of Kandy," and according pretty well with Schinz's description of S. SERPENTARIUS, Belanger. Length of head and body about $4\frac{3}{4}$ in.; tail $2\frac{1}{8}$ in.; tarse to end of claws $\frac{13}{16}$ in.; skull $1\frac{3}{16}$ in. Colour dusky slate, with rufescent tips to the fur of the upper-parts; beneath the fur is shorter and more appressed, and somewhat paler, with a faint tinge of rufous about the breast. Not improbably undescribed, and quite distinct from the two other Ceylon Shrews described *J. A. S.* XX, 163.

SCIURUS. Of this genus, Dr. Kelaart has only sent a fragment of the skin of a young Sc. MACROURUS, Forster (var. of a ruddy-white or whitish-isabelline colour); and, on loan, a skin of the rufous-capped Striped Squirrel, Sc. KELAARTI, Layard (vide note to *J. A. S.* XX, 166), remarkable for having its three pale dorsal stripes unusually clear whitish, the five dark stripes unusually blackish and strongly contrasting, the medial whitish stripe narrow and the lateral broad, and the crown but faintly tinged with fulvous. Neither this nor Sc. BRODIEI are very satisfactorily distinguished from Sc. TRISTRIATUS, of which they seem to be local varieties merely; all retaining the deep rufous tinge under the tail by which they may be at once distinguished from Sc. PALMARUM, and it remains to ascertain whether the *voice* severally differs, as is so remarkably exemplified by Sc. PALMARUM and Sc. TRISTRIATUS.†

The MURIDÆ sent are—GERBILLUS INDICUS, skin and examples in spirit,—MUS INDICUS, Geoffroy, in spirit,—M. FLAVESCENS, Gray,

* Of two specimens of this Shrew sent formerly by Dr. Kelaart, one was labelled S. MONTANUS by mistake, and we thus came to describe both by the name MONTANUS in *J. A. S.* XX, 163, dropping the name FERRUGINEUS by which Dr. Kelaart has since described the same species in XX, 185. He now writes word that he agrees in considering the two specimens referred to as being of one species, his S. FERRUGINEUS; whilst his S. MONTANUS has never been sent here at all, his only specimen having been forwarded to Dr. Andrew Smith in England.

† In a communication just received from Mr. Layard, it seems that he also is now of opinion that Sc. BRODIEI and Sc. KELAARTI may be varieties of Sc. TRISTRIATUS; but in *Ann. Mag. N. H.*, 1852, p. 335, he states of Sc. BRODIEI that its voice is far more shrill than that of Sc. TRISTRIATUS; and also of Sc. LAYARDI, nobis, that—"I shot it in dense jungle, being attracted to it by the *voice*:" but the last is undoubtedly a strongly marked distinct species.

and its var. *kandianus*, Kelaart, *J. A. S.* XX, 169, several specimens in spirit, confirming the opinion expressed *loc. cit.* of the non-distinctness of this as a species from M. FLAVESCENS,—M. NEMORALIS (?), nobis; adolescent? (this is sent as "the common house Rat of Trincomali and Batticoloo; I never," adds Dr. Kelaart, "saw it elsewhere"): M. MUSCULUS, L., from Kandy, skin, and specimen in spirit (the first instance we have seen of the common European house Mouse from any part of Asia, though of course it must be continually brought by the shipping),—and, lastly,—

MUS FULVIDIVENTRIS, nobis, *n. s.* A field Mouse from Trincomali, affined to M. TERRICOLOR, nobis, *J. A. S.* XX, 172, and to another we have since discovered in the neighbourhood of Calcutta.* Length probably about $2\frac{3}{4}$ in.; tail (vertebræ) $2\frac{1}{2}$ in.; tarse to tip of claws $\frac{5}{8}$ in. Colour of M. SYLVATICUS above, the fur shorter and less fine, and straight (as in its various Indian affines); lower-parts rufescent or isabelline, or they may be described as pale weak ferruginous. Twenty caudal vertebræ distinguishable with $\frac{1}{4}$ in. additional of tail-tip.

HYSTRIX HIRSUTIROSTRIS, Brandt: *H. leucurus*, Sykes; *H. zeylonensis*, nobis (the young). Skins and skulls.

SUS——? Three skulls of wild Boars of different ages from Trincomali do not present the peculiarities of form of the skull sent by Mr. Layard, upon which is founded the SUS ZEYLONENSIS, nobis, *J. A. S.* XX, 173; but are nearly affined to the continental race with narrow occiput, this part, however, being rather less narrow than in the Indian specimen described *loc. cit.*

MANIS PENTADACTYLA, L.: *M. brachyura*, Erxl., &c. The skin of a full grown specimen, establishing this species as an inhabitant of the island.

Of Birds, the most remarkable is a new species of CIRCAËTUS or HÆMATORNIS, Vigors, forwarded also by Mr. Layard.

H. SPILOGASTER, nobis, *n. s.* Rather smaller than H. CHEELA, (Lath., v. *undulatus*, Vigors), and remarkable for having the under-parts as in the adult of that species, while the upper-parts, throat and

* M. ALBIDIVENTRIS, nobis, *n. s.* Resembles M. TERRICOLOR, nobis, except in being much larger, and generally greyer or less fulvescent. Length of a large male (fresh) $6\frac{1}{4}$ in., of which the tail is $2\frac{3}{4}$ in.; tarse to tip of claws $\frac{11}{16}$ in.; ear (from anterior base) $\frac{9}{16}$ in.

tail, retain in the adult the same colouring as that of the young of H. CHEELA; a phase of plumage which we have never seen among the multitude of Bengal specimens of H. CHEELA examined, but which is exhibited in the two now received from different parts of Ceylon. A figure of a third specimen is given in a collection of zoological drawings from Ceylon forwarded on inspection by Mr. J. A. Moorgaart. In this the irides are represented *pure white* (as in POLIORNIS TEESA), whereas those of H. CHEELA are *brilliant golden-yellow.*

SPIZAËTUS LIMNAËTUS, (Horsf.), var. CIRRHATUS et *cristatellus*, auct., of peninsular India generally. Specimen rather small.

BUCEROS PICA, Scopoli. The common Pied Hornbill of Ceylon; sent also by Mr. Layard. Identical with Indian specimens: and we therefore consider *B. violaceus*, Shaw, apud Wagler (with four black medial tail-feathers) to be merely a casual or occasional variety, more especially as we have seen continental examples with the sub-medial rectrices partly black.

B. GINGALENSIS, Shaw. Head of male.

CUCULUS SONNERATII, Latham.

MALACOCEREUS GRISEUS, (Lath.), var. Resembling the species of S. India, excepting that the head is concolorous with the rest of the upper-parts.

GRAUCULUS JAVENSIS (? Horsfield). Sent also by Mr. Layard. Differs from GR. MACEI of continental India in its considerably smaller size, the wing measuring but $5\frac{1}{2}$ in., with the rest in proportion.

GALLUS STANLEYI, Gray. A fine hen. We had previously only a pullet of this sex.

DROMAS ARDEOLA, Payk., in immature plumage. An extremely interesting specimen, as distinctly indicating the affinities of this (as hitherto considered) anomalous and isolated genus. The plumage is precisely that of a young Teru: and from all the details of outward structure, it will be seen that this curious form is but an extraordinary modification of the Tern type, just as PHŒNICOPTERUS is a most singular modification of the type of ANSERINÆ. But the Gulls and Terns, or LARIDÆ, are more nearly affined in their whole organization*

* Also by the number and colouring of the eggs, character of the chick, and by

to the great series of CHARADRIADÆ and SCOLOPACIDÆ, auct., than they are to the true PALMIPEDES; and indeed approximate the CHARADRIADÆ, &c., much more than the latter do to either the ARDEIDÆ or RALLIDÆ: and therefore they claim to rank rather among the GRALLATORES than among the NATATORES, though the genus DROMAS alone assumes the characteristic proportions of an ordinary wader. It will be remarked that the habits of DROMAS are entirely those of a sea-side Tern: and an egg formerly sent by Mr. Layard as most probably appertaining to this species (and it could not well have belonged to aught else) is further confirmatory of the view here taken of the position of this remarkable genus in the natural system.*

PORZANA ZEYLANICA, (Gm.) Differs from a specimen from Gumsur in the deep rufous colour being more developed at the base of the nape, and also margining the scapularies, wing-coverts, and longest tail-coverts, where no trace of it is perceptible in the Gumsur specimen. The latter would seem to be of a distinct variety, if not closely affined species.

A few other specimens in this class require no special notice.

Of Reptiles, Dr. Kelaart has forwarded—

TESTUDINATA. EMYS SEBA, Gray (sent also by Mr. Layard),—and EMYDA PUNCTATA, Gray (v. *Cryptopus granosus*, Dumeril and Bibron).

SAURIA. CROCODILUS PALUSTRIS, Lesson;—MONITOR DRACÆNA, (L.), Gray (v. *Varanus bengalensis*, D. and B.);†—HEMIDACTYLUS FRÆNATUS, Schl.; H. COCTÆI, D. and B. (common in Bengal, but not hitherto observed in S. India); H. LESCHENAULTII, D. and B.;—LYRIOCEPHALUS SCUTATUS, (L.), 5 adults; CALOTES OPHIOMACHUS, (Merrem); C. VERSICOLOR, (Daud.):—C. ROUXI (?), Dumeril and Bibron, and C. MYSTACEUS, Dumeril and Bibron, were sent formerly by Mr. Layard.

the seasonal changes of colouring of the genus HYDROCHELIDON in particular: by the voice likewise; and by their haunts and general habits.

* In PODICA and HELIORNIS we recognise the converse modification, in a Rallidous genus presenting the proportions of an ordinary swimmer. *N. B.* It should be remarked that we perceive little affinity between the true LARIDÆ and the PROCELLARIDÆ (or Albatrosses and Petrels).

† V. BIBRONI, nobis, *J. A. S.* XI, 869, we now consider to be a variety merely of this species, which appears to be the only *Varanus* of all peninsular India.

BATRACHIA. RANA CUTIPORA, D. and B.; R. MALABARICA, auct.; R. BENGALENSIS, Gray; ENGYSTOMA MARMORATUM; POLYPEDATES LEUCOMYSTAX, (Grav.); P. CRUCIGER, nobis, *n. s.*; BUFO MELANOSTICTUS, Schneider.

CALOTES OPHIOMACHUS. Specifically identical with an example from the Nicobars, noticed *J. A. S.* XV, 376:* but a nearly affined CALOTES from Cherra Punji (presented by Mr. Frith) differs in having the head much flatter, the nuchal spines less laterally compressed or widely flattened and more rigid, being scarcely at all expanded on their terminal half, and in having a well marked second sincipital crest above the ear, shewing eight spines, the first three of which are short and the fifth longest: there is also no black stripe through the eye.—C. PLATYCEPS, nobis, *n. s.*

C. VERSICOLOR. Specimens very strongly mottled, but apparently identical with the extremely common and only species of this genus we know of in Lower Bengal.

C. ROUXI? This species is probably distinct and undescribed; but as Dr. Kelaart has forwarded a series of Ceylon reptiles to Dr. Andrew Smith in England, we decline naming it at present. Crest of elevated flattened spines much longer than in C. VERSICOLOR, continued along the entire back and over the base of tail; two isolated spines, one before the other, above the ears; oblique plait of neck, before the shoulders, well marked in adults; a very slight *fanon*, or indication of one, on the throat; lateral scales fully twice as large as the abdominal; longest hiud-toe reaching to the ear; tail $\frac{2}{3}$ of the total length: colour fulvous-green, reddening on the throat of two specimens under examination; tail (in the faded specimens) chiefly albescent; radiating dark marks on the eyelids, as in C. VERSICOLOR.

C. MYSTACEUS.† Nuchal and dorsal crest diminishing gradually to base of tail; two separate groups of 3 or 4 spines each above each ear; lateral scales not much larger than the abdominal; a very distinct well marked *fanon* in adults; tail $\frac{2}{3}$ of the total length; longest

* The supposed CALOTES MYSTACEUS of the Nicobars, *loc. cit.*, is a SALEA of Mr. Gray, except that the back is crested throughout; and a very similar species in the museum, save that the throat-skin is lax and forms a sort of *fanon*, was procured, we believe at Mirzapore, by the late Major Wroughton.

† Identical in species with examples since received from Rangoon.

hind-toe reaching to the ear ; colour remarkable, green, with 4 or 5 large red blotches on each side ; the tip of upper lip, border of under lip, and nape, appear to have been blue in adults ; and the border of the lower lip yellow, continued as a broad stripe to the shoulder ; no radiating mark on the eye-lids.

Rana bengalensis, Gray, Hardw. *Ill. Ind. Zool.* In *J. A. S.* XVI, 1016, Dr. Cantor supposes the figure cited to have been perhaps intended for R. Leschenaultii. It is, however, a common Calcutta species which we had not previously seen from elsewhere, being more affined to R. malabarica, from which it differs in its much smaller size (never, that we have seen, attaining the magnitude of adult R. temporaria), and much more slender toes which are fully webbed ; the colouring is nearly similar, but it appears never to have the pale dorsal stripe, and the dark markings of the back are generally obsolete ; there are never any distinct dark bands, also, upon the rami of the lower jaw, but the entire throat is *marbled* more or less distinctly. Another common Calcutta species of the same or smaller size (inhabiting also Arakan) is coloured exactly as in R. malabarica and varies similarly ; but this (R. assimilis, nobis,) has invariably the hind-feet much less webbed, and the long second toe is nearly free for its terminal three phalanges.

Polypedates cruciger, nobis, *n. s.* This fine Tree Frog much resembles P. leucomystax in form, but is double the size, with no spots on the body, nor marbling of the posterior surface of the thigh ; but a black line proceeds from each eye obliquely across to the loin on the opposite side, the two crossing each other over the occiput, and there is a small transverse line before and behind respectively, connecting the extremities of the two long diagonal lines ; a black lateral line also from the corner of the eye terminates in a large black spot in some specimens, while in others the whole of these markings are more or less obliterated. Length of head and body $3\frac{1}{4}$ in. ; of hind-limb to extremity of toe 5 in.*

In a collection of zoological drawings from Ceylon, obligingly forwarded for inspection by Mr. J. N. Moogaart (at the request of Dr.

* We have a still finer Tree Frog from the Naga hills, Asám (P. smaragdinus, nobis). Length of head and body $3\frac{1}{4}$ in. ; hind-limb $5\frac{1}{4}$ in. Wholly green above, changing in spirit to livid-blue ; under-parts pale.

Kelaart), we further recognise the common EUPREPIS MULTIFASCIATUS, (Wagler),—RANA LESCHENAULTII, D. and B.,—ENGYSTOMA MALABARICUM, Jerdon,—and a fine species of MEGALOPHRYS. CALOTES OPHIOMACHUS is coloured variously, and the fully adult at the height of the breeding season would appear to be of a deep blackish-green, with the usual transverse narrow white body-stripes, and the head and throat dark crimson.

FISHES. LETHRINUS——? Affined to L. HARAK, (Forster), and found also at the Sandheads;—PLATAX OCELLATUS, C. and V.; SYNANCEIA BRACHIO? (fine specimen);—XYRICTHYS TÆNIURUS, Val.; CANNORHYNCHUS *(Fistularia,* auct.,) IMMACULATUS, (Forster);—ECHENEIS REMORA (probably from the Atlantic).

TETRODON ARGENTATUS, nobis, *n. s.* Affined to T. OBLONGUS, Bloch. Colour livid brown above, with numerous specks and some larger scattered round spots of a deeper hue; dilatable abdominal skin of a livid or dead white; on the side a broad brilliant silvery stripe from mouth to tail, enclosing the pectoral, and a similar spot before the eye. Irides golden. Length $5\frac{1}{2}$ in.; distance from snout to pectoral $1\frac{5}{8}$ in.; do. to dorsal 3 in.

6. From E. L. Layard, Esq. A collection of sundries from Ceylon. Among them is the skin of a Squirrel, which we consider to be merely a pale variety of SC. MACROURUS, with worn and faded fur. Among the birds, we find a second example of CARPOPHAGA PUSILLA, nobis, *J. A. S.* XVIII, 816, described from a Nilgiri specimen: and the male and female of what will doubtless prove to be TRERON POMPADORA, (Gm.); differing only from TR. MALABARICA, Jerdon, in having a broad yellowish-green forehead, no trace of ruddy-orange on the breast of the male, and sullied white lower tail-coverts in both sexes (those of the male TR. MALABARICA being constantly of a deep ferruginous hue). The females are similar excepting in the colour of the forehead. Size rather inferior to that of TR. MALABARICA, the length of closed wing $5\frac{1}{2}$ in. An EDOLIUS is also peculiar, and nearly resembles E. PARADISEUS of the Malay countries, but has the frontal crest more developed, though much less so than in the EDOLII we have seen from S. India. BUCEROS PICA, Scopoli, is also sent as the common Pied Hornbill of the island: and other species of birds worthy of remark are PIPRISOMA (SMICRORNIS?) AGILE,—new to the Ceylon

fauna,—and DRYMOCATAPHUS FUSCACAPILLUS, nobis, *J. A. S.* XVIII, 815, but which should rather have been classed in PELLORNEUM.*

Mr. Layard has further favored us with a most valuable and interesting collection of shells, in all more than 200 species, and we have now to thank him for about 170 species, and fine series of many of them,—land, fresh-water, and marine,—while of others are sent inferior or imperfect examples, for report as to whether we required good specimens of the same, in which case Mr. Layard will forward them and has probably ere this done so. The species presented by him to the Society are from various parts of the world, but a large proportion of them, particularly of the land and fresh-water species, are from Ceylon.†

* In the genus PELLORNEUM should likewise be merged DUMETIA, nobis, founded on the *Timalia hyperythra*, Franklin, of S. India and Ceylon, *Malacocercus? albogularis*, nobis, *J. A. S.* XVII, 453. There would thus be four ascertained species of PELLORNIUM, Sw., all closely affined to MALACOCERCUS in form and habits.

† The following species of fishes have also, on different occasions, been presented to the Society by Mr. Layard.

UPENEUS RUSSELLII, C. and V.;—HOLOCENTRUM ORIENTALE, C. and V.;—PLATYCEPHALUS SCABER, (Bloch);—GLIPHISODON RAHTI, C. and V.;—CHÆTODON SEBANUS, C. and V.;—CH. LAYARDI, nobis, *n. s.*;—ACANTHURUS TRIOSTEGUS, (Bloch);—A. XANTHURUS, nobis, *n. s.*;—AMPHACANTHUS JAVUS, (L.);—A. SUTOR, C. and V.;—BARBUS TOR (? B. Ham.), young;—HEMIRHAMPHUS GEORGII, Val.;—and RHOMBUS TRIOCELLATUS, Cuv.

CHÆTODON LAYARDI, nobis, *n. s.* Affined to CH. VAGABUNDUS, L. General colour (in spirit) golden-brown, with a broad vertical blackish band from occiput to throat passing through the middle of the eyes, bordered behind by a white band of similar breadth, and this by a much narrower dark streak not reaching to the throat; lips and chin black, separated from the dark ocular band by a white space of the same breadth; fins whitish, with a single black band crossing the tail,—another extends throughout the soft portion of the anal, and having a strongly defined white border above, and a less defined whitish border below, and the posterior or descending portion of the dorsal has also a similar black band, continued a little over the base of the tail; longitudinal bands on the sides as in CH. VAGABUNDUS, &c. *D.* $\frac{13}{21}$; *A.* $\frac{3}{19}$; *C.* 17; *P.* 15; *V.* $\frac{1}{5}$. Length of specimen $2\frac{7}{8}$ in.

ACANTHURUS XANTHURUS, nobis, *n. s.* Affined to A. XANTHOPTERUS, Cantor, but deeper in the body, and wholly black with bright golden-yellow tail, and a tinge of the same upon the pectorals. *D.* $\frac{5}{24}$; *A.* $\frac{3}{21}$; *C.* 17; *P.* 15; *V.* $\frac{1}{5}$. Length of specimen $7\frac{1}{2}$ in.

Two species of Snakes have also been sent by Mr. Layard, viz. TRIGONOCEPHALUS HYPNALIS, (Merrem), and XENODON PURPURASCENS, var.

7. From Walter Elliot, Esq., Madras C. S., now at Masulipatam. Three specimens of TUPAIA ELLIOTI, Waterhouse; the Tupaie of the Coromandel coast. According to Mr. Waterhouse, this animal "is about equal in size to T. TANA;" but the examples here noticed do not exceed T. FERRUGINEA in size, and are obviously distinct as a species from either of those of the Malay countries.

8. From Babu Rajendra Mallika. The carcass of a small Indian Bear (skull only preserved). Also that of a kid of TETRACEROS QUADRICORNIS, and do. MUNTJACUS VAGINALIS.

9. From the Barrackpore menagerie. Carcasses of PRESBYTIS MAURUS, and of a very fine male Leopard,—both skin and skeleton preserved of the latter.

10. Dr. A. Bedford. Skin of EURYNORHYNCHUS PYGMÆUS, procured at the Sandheads.

11. Mrs. E. Woodley. A white Sparrow.

12. Mr. R. Smith. A species of MANTIS.

13. Capt. McFarlane, of the barque 'Arrow.' Two specimens of an OCTOPUS, "blown or washed on board during a typhoon in the Chiua Sea."

E. BLYTH.

Report of Curator, Zoological Department.

SIR,—My Report for the present meeting records the donations to the Zoological Department of the Society's Museum for the last three months, which are as follow:

1. From C. T. Lushington, Esq. The carcass of a young GLOBICEPHALUS (or 'Ca'ing Whale'), of the species noticed in *J. A. S.* XIX, 426, killed in the Hugly near Scrampore. It has been prepared as a stuffed specimen; and of the adult we possess skeletons of both sexes, that of the female having been mounted or put together. Closely affined to the European GL. DEDUCTOR, this species differs externally in being wholly of a black colour. Its intermaxillaries are shorter; the teeth fewer and larger, numbering 6 or 7 above and 7 or 8 below on each side; the upper view of the maxillaries differs considerably in contour, being broader and less elongated in the Indian species; and there are other discrepancies which are less marked. GL. INDICUS, nobis, *n. s.*

2. From Capt. T. P. Sparkes, Ramri. The left radius, two lumbar and one sacral vertebræ, of an enormous Whale (BALÆNOPTERA?); and two lumbar vertebræ and the second (?) right rib of a smaller Whale. These Capt. Sparkes supposed to have belonged to one individual, respecting which he contributes the following information. "The Whale was

thrown up dead and in a horrid state of decomposition on Juggoo or Amherst Island during last rains. I was unable to see it myself, but was told that the carcass measured 84 ft. in length. The vertebræ and rib were all that I could recover on visiting the island just before I came up to Calcutta, with the exception of the two jaw-bones, each about 14 ft. long, which the steamer was unable to bring up last trip, but which I will send you on her return this time from Arakan. This is the only instance I have heard of, of a Whale being stranded on the Coast of Arakan." Nevertheless, the bones sent are certainly those of two individuals and probably species, differing materially in size;* and we have a note of a Whale of the largest size having been stranded on the Chittagong Coast, as recorded in the 'Friend of India' newspaper for September 15th, 1842, and copied into most of the contemporary Indian Journals; but no description was taken of it that would determine the genus.

3. From Mr. E. Lindstedt. A specimen, evidently an adult male, of ACCIPITER NISOIDES, nobis, *J. A. S.* XVI, 727, and shewing that the example previously described was the skin of a younger male and not of a female; also the skin of a presumed adult male BATRACHOSTOMUS AURITUS, (Vigors), differing from the supposed adult female in its rather smaller size and much darker and less rufescent colouring; an example of BUTALIS LATIROSTRIS, (Raffles), v. *poonensis*, Sykes, et *terricolor*, Hodgson; and the nest of a species of DICÆUM,—all from Malacca.

4. From Capt. Phayre, Commr. of Arakan. The skull and an imperfect skin of a Hare "from the east side of the range of mountains dividing Arakan from the valley of the Irawaddi, where the S. W. monsoon is much modified." It would appear to be identical with LEPUS SINENSIS, Gray, of Hardwicke's 'Illustrations of Indian Zoology,' known only by that figure. The skull closely resembles that of LEPUS RUFICAUDATUS, Is. Geoff. (the common Bengal Hare); and so far as can be judged from what remains of the skin (the ears having been destroyed), the general structure would appear to be quite similar: but the colouring is remarkably different; being a mixture of deep tawny or rufo-fulvous with much black on the upper-parts, and the under-parts whitish. The paws are black underneath, mingled with some tawny along the lower surface of the tarsus; the latter being almost pure white externally, and thus forming a remarkable and striking contrast with the hue of the lower surface. Tail black above and at the tip, whitish below towards its base. On the sides towards the belly

* Indeed the sacral vertebra above noticed very probably pertained to a third individual, judging from the fact that it presents the appearance of having been much longer exposed to the effects of atmospheric and other destructive influences.

the fur much resembles both in colour and texture that of the entire upper-parts of L. RUFICAUDATUS; but on the back the fulvous hue is very much deeper and the admixture of black is much greater: the short soft under-fur is deep buff or fulvous, whereas in L. RUFICAUDATUS the same is whitish or rather almost pure white.*

5. From Mr. A. Harris. A specimen of SQUILLA RAPHIDEA, Fabricius.

6. From Babu Rajendra Mallicka. Fresh specimens of GOURA CORONATA and CARPOPHAGA SYLVATICA, which have been prepared as skeletons; and a kitten of FELIS BENGALENSIS.

7. From the Barrackpore menagerie. A carcass of PRESBYTIS MAURUS, fœm., and one of a doe Antelope, A. CERVICAPRA.

8. From Capt. Robt. Tytler, 38th Lt. Infantry. Sundry specimens of Rats and of Bats, chiefly from the vicinity of Barrackpore; and examples of HESPESTES NYULA and H. AUROPUNCTATA from the Midnapur district.

9. From Dr. McGowan, Ningpo. Two valves of a species of AVICULA mussel, with extraneous substances introduced artificially and encrusted with *nacre* or 'mother of pearl' deposit, as noticed in p. 188, ante.

10. From Capt. Thos. Hutton, Masuri. A collection of Bats taken out of spirit and sent down with camphor in a closed tin canister, which proves to be a most excellent mode of transmitting small animals from a distance. Of nine species, at least four are European and included with more or less justice in the *Fauna Britannica*. These are BARBASTELLUS COMMUNIS, Gray, MYOTIS MURINUS, (Geoff.), M. PIPISTRELLUS, (Schreber), and SCOTOPHILUS SEROTINUS, (Schr.) Of two other species of SCOTOPHILUS, one only differs a little in colour from a specimen sent by Mr. H. E. Strickland as Sc. DASYCARPUS, (Leisler); and the other would seem to be undescribed.† Three species of RHINOLOPHUS sent are RH.

* Hares are unknown in Arakan and in the Tenasserim provinces; also throughout the Malayan peninsula and archipelago, with the exception of LEPUS NIGRICOLLIS, F. Cuv., in Java, which has most probably been introduced from S. India or Ceylon, as it doubtless likewise has in the Mauritius; but we have met with several notices of Hares in the Indo-Chinese countries, even in Cochin China, the species being as yet undetermined.

† As so many of the European species of Bats thus extend their range to the Himalaya, we may look out with some confidence for others. As regards PLECOTUS, for instance, upon the most careful comparison of fine English specimens of PL. AURITUS with the description of PL. HOMOCHROUS, Hodgson, *J. A. S.* XVI, 894, the only difference we can detect is that the Himalayan PLECOTUS would seem to have shorter fur above; a most unsatisfactory distinction, and only one specimen of it had been observed: and good examples of VESP. LABIATA, Hodgson, much require to be compared minutely with equally good examples of the European NOCTULA.

TRAGATUS, Hodgson,* RH. MACROTIS, Hodgson, and a species found also in Lower Bengal which appears to be RH. MINOR, Horsfield, and (in its occasional rufous phase) *Rh. subbadius*, Hodgson.†

E. BLYTH.

March 2nd, 1852.

Report of the Curator, Museum of Economic Geology.

Geological and Mineralogical.—We have received, from Dr. Kelaart of Ceylon, two specimens of Granite, one of which is a garnet granite, the Garnets being of the Essonite or Cinnamon-stone variety. It also contains some minute semi-crystallised dull black-green grains which may be hornblende or tin ore, but the only assay I could take from such a small specimen leaves it uncertain if the reduced metal was iron or tin.

Economic Geology.—Captain Sherwill has sent us from Singrowlee in Rewah—

Native Copper from near the fort of Burdee on the Soane River;

Copper Pyrites;

A fine red *Gossan* of Copper from that quarter;

Gold Dust Sand from Jushpore;

Coal of a very fine appearance;

Galena, Iron ore, Iron Pyrites, Limestone and Zinc Blende.

The first and last articles of this list are the most remarkable; the Copper for its purity (and Captain Sherwill's informant says there is plenty of it!) and the zinc ore as being a novelty in Lower India,‡ and both may be

* Perhaps the RH. MITRATUS, nobis, *J. A. S.* XIII, 483, may prove to be no other than this, though the ear-conch (in the dried specimens) would seem to be somewhat larger; and the additional Indian species now ascertained to those above noticed, are RH. AFFINIS (?), Horsfield, from Ceylon, vide p. 346, *ante*,—RH. ROUXI, Temminck,—and RH. PEARSONII, Horsfield, 'Catalogue of the specimens of Mammalia in the Hon'ble Company's Museum' in London.—Of the affined genus HIPPOSIDEROS the ascertained Indian species are those mentioned in my last Report, p. 346, *ante)*; and the curious genus CÆLOPS, nobis, *J. A. S.* XVII, 251, is evidently much affined to MORMOOPS of Leach, figured in *Lin. Trans.* XIII, t. 7, p. 77, now ascertained to inhabit Cuba,—and to CENTURIO, Gray, ('Zoology of the Voyage of the Sulphur'), uncertain whether from Amboyna or from S. America: but it has not the singularly elevated cranium of the former genus, nor is the ear-conch bifid to the front, as in both the others. The tail and interfemoral membrane resemble those of CENTURIO; and the middle finger has three phalanges, whereas that of CENTURIO has four (as generally in the PHYLLOSTOMA group).

† Vide p. 347, ante.

‡ The only Indian Ores of Zinc which we have till now are from Jawar in Ajmeer (See Journal Vol. XIX, p. 212) presented by Captain Brooke.

cited as another instance of how much we have to discover on all sides of us.

From Captain Haughton, 1st Asst. to the Governor General S. W. Frontier, we have received a larger specimen of the Serai Kela Copper Ore which is composed of an impure earthy Oxide of Iron and Copper, with Silicates, Carbonates and Sulphurets of Copper.

From the Rev. F. Fitzgerald, we have received some specimens of the Auriferous Quartz Rock of North Carolina.

I have put into the form of a notice for the Journal my account of another Amalgamation experiment made with 14 lbs. of the Argentiferous Copper ore (*Pacos* and *Colorados*) from the Deoghur mine, for which we are again indebted to Captain Sherwill, and it will be seen that the result has fully justified my anticipation of finding a richer ore than those we before experimented upon.

H. Piddington,
Curator, Museum Economic Geology.

Library.

The following books have been presented to the Library since the last meeting.

Bombay Magnetic and Meteorological Register, 1848. Bombay, 1851. 4to.—By the Superintendent of the Observatory.

Icones Plantarum Asiaticarum, Part III. Monocotyledonous Plants. By Dr. W. Griffith. Calcutta, 1851, 4to. (2 copies).—By the Government of Bengal.

Notulæ ad Plantas Asiaticas, Part III. Monocotyledonous Plants. By Dr. W. Griffith. Calcutta, 1851, 8vo.—By the Government of Bengal.

Journal of the Indian Archipelago, for January, 1852, 2 copies.—By the same.

Memoirs of the Royal Astronomical Society, vol. XX.—By the Society.

Monthly Notices of the Royal Astronomical Society, vol. XI.—By the same.

The Oriental Christian Spectator, for February, 1852.—By the Editor.

The Missionary, for March, 1852.—By the Editor.

The Oriental Baptist, for April, 1852.—By the Editor.

The Calcutta Christian Observer, for April, 1852.—By the Editors.

The Upadeshak, for April, 1852.—By the Editor.

The Citizen, for March, 1852.—By the Editor.

Purṇachandrodaya, for March, 1852.—By the Editor.

The Tattwabodhiní Patriká, No. 104.—By the Tattwabodhiní Sabhá'.

Bibidhártha Sangraha, No. 4.—By the Editor.

Rá'jendrala'l Mittra.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of April, 1852.

Date.	Observations made at Sun-rise.						Maximum Pressure observed at 9 h. 50 m.						Observations made at Apparent Noon.					
	Bar. red. to 32° F.	Temperature.			Wind.	Aspect of Sky.	Bar. red. to 32° F.	Temperature.			Wind.	Aspect of Sky.	Bar. red. to 32° F.	Temperature.			Wind.	Aspect of Sky.
		Of Mer.	Of Air.	W. Bulb.	Direction at Sun-rise.			Of Mer.	Of Air.	W. Bulb.	Direction at 9h50m.			Of Mer.	Of Air.	W. Bulb.	Direction at Noon.	
	Inches	°	°	°			Inches	°	°	°			Inches	°	°	°		
1	29.761	77.2	77.3	70.2	W.	Cloudy	29.830	78.0	79 0	71 8	N.	Cloudy	29 825	84.4	85.6	73.6	W.	Cloudy
2	.761	73.8	73 7	70 4	N.N.W.	Cirro-cumuli	.814	79.4	81.3	75,2	W.N.W.	Cirro-strati	.782	85.2	87.0	76,4	W.	Cirro-cumuli
3	.727	77.0	77.6	75.5	S. S. W.	Cumuli	.824	83.4	84.4	78.8	W.	Cumulo-strati	.796	87.3	88 4	79.2	W.	Clear
4S.	.813	72.3	72 3	70.0	N. W.	Cirro-cumuli	.900	80.2	82.2	72,6	W.	Clear	.861	84.4	85.0	73.6	W.N.W.	Ditto
5	.879	75.4	75.7	73.6	S. W.	Ditto	.952	81.4	84.0	76.0	N. W.	Cirro-cumuli	.918	86.7	88.4	75.8	W.N.W.	Ditto
6	.864	77 0	77.8	76.3	S. W.	Cloudy	.934	82.8	85.0	78.6	S. W.	Clear	.903	88.0	90.0	78,5	S. S. W.	Ditto
7	.831	76.2	76.0	74.4	S. S. W.	Cirro-strati	.896	82,3	84.5	73.0	W.	Ditto	.857	89.6	92.0	70,2	N. W.	Ditto
8	.823	74.0	73.8	71.0	S. W.	Ditto	.888	82.3	85.4	74.0	S. W.	Ditto	.842	90,6	93.6	69.4	S.	Ditto
9	.806	78.0	77.9	75.8	S. S. W.	Ditto	.861	84.4	86.2	74.7	W.	Cirro-cumuli	.825	89,2	91.2	74.6	W.	Cirro-cumuli
10	.785	78.5	78.3	76 0	N. E.	Clear	.862	85.3	87.4	78.3	N. E.	Clear	.841	91.0	93,6	78,3	N. E.	Clear
11S.	.817	79.0	78 8	77.0	S. E.	Cirro-cumuli	.887	85.3	87.6	76.6	S. W.	Ditto	.854	90.2	92.0	75.4	W.	Ditto
12	.847	76 0	75.5	69.8	N. E.	Clear	.904	83.0	85.0	71.2	W.	Cirro-cumuli	.873	88.0	89.5	73.6	S.	Ditto
13	.877	76.0	76 3	74.4	S.	Ditto	.944	86,0	88 3	77.0	S. W.	Clear	.911	90.8	93.0	77.2	S.	Ditto
14	.872	78.2	78.2	76 3	S. S. W.	Ditto	.926	85.9	88,0	79.0	S. S. W.	Ditto	.902	91.7	94.0	76.5	W.	Ditto
15	.878	79.4	79.2	77.4	S.	Scattered clouds	.935	86 4	89.0	78.9	S.	Cumuli	.905	91.7	92.2	75.6	S. W.	Cumulo-strati
16	.844	79.3	79.4	77 4	S. S. W.	Cirro-cumuli	.895	86.5	89.2	78 6	S. W.	Clear	.835	91.7	93.7	76.5	S. W.	Clear
17	.805	79.0	79.2	77.0	S. S. W.	Cirro-strati	.858	86.8	89 0	78.2	S. S. W.	Ditto	.814	92.4	95.0	78,2	S.	Ditto
18S.	.795	78.8	78.4	77.0	S. E.	Clear	.854	86,3	88,6	80.4	S. S. W.	Ditto	.814	90.6	92.2	81.4	S.	Ditto
19	.785	79.0	79.0	77.6	S.	Scattered clouds	.830	86,7	88.4	81.0	S.	Cumuli	.777	92.0	93.8	81.6	S. S. W.	Ditto
20	.725	79.5	79.2	77.8	S. W.	Clear	.758	87.0	89.6	82,6	S. W.	Clear	.708	93.2	95.4	82,6	S.	Ditto
21	.657	81.0	80 5	78.2	S.	Ditto	.708	88,0	90,0	81.8	S.	Cumuli	.673	92.6	94,2	83,2	S.	Ditto
22	.582	81.4	81.4	78.0	S.	Cloudy	.652	88,0	89.6	81.0	S.	Ditto	.638	91.7	93.0	82,4	S.	Cumuli
23	.704	82.2	82.3	79.4	N. E.	Ditto	.749	86,0	88.4	81.3	S. E.	Cumulo-strati	.708	91.8	93.6	81.6	S. E.	Cumulo-strati
24	.725	79.4	80.6	78.9	S.	Ditto	.824	87.0	88,4	78.4	W.	Ditto	.778	90.3	91.0	79.2	W.	Cirro-strati
25S.	.757	80.0	80.0	78.4	S. S. W.	Cirro-strati	.836	87.0	89,2	81.3	S.	Cirro-cumuli	.787	91.4	93.3	82,8	S.	Ditto
26	.773	75.5	74.9	70.3	S.	Drizzly	.863	83.6	86,5	77.3	S. S. W.	Ditto	.825	90,3	93.0	78.3	S. S. W.	Ditto
27	.736	75.0	75.3	71.8	S. S. W.	Cirro-strati	.781	84.4	86,5	78,0	S. S. W.	Cirro-strati	.738	89.5	91.8	79.4	S.	Clear
28	.643	79.8	79.8	77.2	S.	Ditto	.727	86,0	88,6	75.4	S. W.	Ditto	.696	91.6	93.4	78.0	W.	Cirro-strati
29	.643	79.8	79.8	76.8	S.	Ditto	.747	88.8	91.0	81.4	S.	Ditto	.712	92.9	94.4	82.6	S. W.	Cirro-cumuli
30	.739	76.4	76.6	73.2	S.	Cirro-cumuli	.800	85.0	86,8	80,4	S.	Cloudy	.781	86,2	87.8	81.2	S. S. W.	Ditto
Mean.	29.775	77.8	77 8	75.2	....	.....	29.841	84,8	86.9	77,8	....	.....	29.806	89.9	91.7	77.9	....	.....

[*Meteorological Register, continued.*]

Observations made at 2h. 40m.						Minimum Pressure observed at 4 p. m.						Observations made at sun-set.						Maximum and Minimum Thermometer.			Max. Therm. in Sun's rays.	Rain Gauges. Elevations.		Moon's Phases	Date.
Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 2h 40m p. m.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 4 p. m.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at Sun-set.	Aspect of Sky.	Max.	Mean.	Min.		Feet. 60. Upper	Feet. 5. Lower		
Inches	°	°	°			Inches	°	°	°			Inches	°	°	°			°	°	°		Inch.	Inch.		
29.748	88.0	89.8	74.2	N.	Cirro-cumuli	29.724	90.2	90,8	76.4	S.	Cirro-cumuli	29,722	87.8	86.2	77.2	S. W.	Clear	91.2	82.4	73.6	108.7	..	..		1
.702	90.3	92.3	76.2	N. W.	Clear	.670	91.8	93 0	75.2	N.	Cirro-strati	.672	89.6	88.0	76.0	S.	Cirro-strati	92.6	81.5	70.4	110.2	..	..		2
.697	91.6	93.2	78.3	N. W.	Ditto	.667	93.0	94.0	76.9	W.	Ditto	.706	90.0	88.5	75.4	N.	Cloudy	93 6	83.6	73.6	112.0	0.26	0.28		3
.773	89.0	89.9	74.6	S. W.	Ditto	.762	89.9	90.0	76.0	S. W.	Clear	.763	87.4	85.7	77.0	S.	Clear	90.8	80.0	69 2	107.4	..	..	⊙ 8 h.	4
.829	90.8	91.7	76.2	S. E.	Ditto	.800	91,6	92,2	75.6	E.	Ditto	.808	89.4	87.4	78.4	S. W.	Ditto	92.8	82.7	72.6	113.3	..	..		5
.827	91.3	92.3	75.7	W.	Cirro-cumuli	.811	91.9	92.6	77.3	W.	Cumuli	.807	88.8	88.0	78.6	S.SW.	Scatd. clouds	92.7	83.6	74.4	111.0	..	..		6
.798	94.0	95 2	70.2	w.N.w	Clear	.764	94.6	95.2	69.3	w.N.w	Clear	.769	90.4	88.3	76.2	S.	Clear	95.3	84.0	72.6	109.0	..	..		7
.784	94.6	96.0	71.4	W.	Ditto	.763	95.2	95.6	71.8	S. W.	Ditto	.756	92.5	89.7	74.5	S. E.	Ditto	96,2	83.7	71 2	112,8	..	..		8
.742	94.0	95.0	73.6	S. W.	Ditto	.723	95.0	95.4	74.0	W.	Ditto	.722	92.4	90,9	78.7	S.SW.	Scatd. clouds	95.8	85.4	75.0	113.7	..	..		9
.771	95.3	96.8	76.3	N. E.	Ditto	.751	96.0	96.9	78.3	NNW	Ditto	.750	93.0	91.3	78.5	N. W.	Clear	96.9	86.2	75.4	116.4	..	..		10
.770	94.0	95.0	76.5	S. W.	Ditto	.734	94.7	95.0	78.3	S. W.	Ditto	.743	92.0	90.4	78.3	S. W.	Cldy. to the W.	96.0	86.0	75.9	113.2	..	..	☾ 2 h.	11
.798	91.6	92.8	74.0	S.SW.	Ditto	.765	92.6	94.0	75.6	S.	Ditto	.782	90.3	88.2	74.4	S.	Clear	94.0	83.4	72.8	112.7	..	..		12
.824	94.4	96.0	77.3	S. W.	Ditto	.784	95.3	95.4	77.4	S.	Ditto	.787	92.6	92.0	76.9	S.	Ditto	96.4	84.7	73.0	113.3	..	..		13
.816	96.0	97.3	75.5	S.	Ditto	.788	96.0	95 3	70,3	S.	Ditto	.808	90.0	87.5	75.6	S.	Scatd. clouds	97.3	86.3	75.3	113 0	..	..		14
.825	95.2	96.4	76 3	S. W.	Ditto	.790	96.0	96.3	77.0	S. W.	Cirro-strati	.793	91.8	89.7	70.2	S.SW.	Clear	97.2	86.8	76.4	112,4	..	..		15
.757	95.2	96 2	78.0	S.	Ditto	.729	96.0	96.2	78.3	W.	Cumulo-strati	.728	92.4	90.3	75.3	S.	Ditto	97.4	87.0	76.6	114.6	..	..		16
.731	95.8	96.5	76.0	S.	Cirro-strati	.690	95.5	95.5	77.4	S.	Clear	.717	89.7	87.4	75.6	S.	Ditto	97.0	86.7	76.3	111 8	..	..		17
.738	93.3	94.0	80,3	S.SW.	Ditto	.708	93.9	93.8	79.8	S.	Cirro-strati	.718	89.4	88.0	80.2	S.	Cirro-strati	94.6	85,1	75.6	111.6	..	..		18
.682	95.4	95.6	84.0	S.	Clear	.654	95.2	94.6	83,3	S.	Clear	.658	90.8	89.0	81.9	S.	Cumulo-strati E	97.0	86.5	76.0	111.4	..	..	● 5 h.	19
.628	96.4	96 5	85,2	S.	Cumulo-strati	.590	95.8	95.6	82,2	S.	Cumulo-strati	.610	91.0	88.0	76.4	S. E.	Cloudy	97.8	87.1	76.4	113.3	..	..		20
.583	95.6	96.3	84.4	S.	Clear	.554	95.7	95.4	82.2	S.	Clear	.574	89.0	87.0	79.6	S.	Cirro-strati	96.8	87.2	77.6	111.7	..	..		21
.593	93.9	94.0	83,2	S.	Cumuli	.570	92,8	92.2	81.4	S.	Cumuli	.595	87.8	86.6	80,4	S.	Cloudy	94.9	86.4	77.8	107.4	..	..		22
.656	94.0	93.2	81 0	S. E.	Cumulo-strati	.638	91.2	90.4	80.4	S.	Cloudy	.658	87.4	86.8	80.0	S.	Ditto	95.4	87.4	79.4	109.3	0,06	0.08		23
.688	91.0	92.4	78.6	N. W.	Scatd. clouds	.681	92,4	93.4	78.6	S.SW.	Cirro-strati	.686	88.2	87.4	78.0	S.	Ditto	93.4	82.5	71 6	112.6	..	..		24
.730	94.0	93.8	81.2	S.	Cirro-strati	.686	93.4	93.0	79.6	S.	Cumulo-strati	.676	89.0	87.4	80.2	S.	Cirro-strati	95.4	86.2	77.0	108.5	..	..		25
.749	92.2	91.6	79.4	S.	Ditto	.720	91.6	91.0	80.8	S. W.	Cirro-cumuli	.734	86.5	85.6	78.8	S.	Cloudy	93.9	82.7	71.5	106.8	0,30	0,32		26
.672	94.2	95.8	80.6	S.SW.	Clear	.646	94.0	93.0	83.0	S.	Clear	.630	89.0	86.8	79.4	S.	Clear	95.9	83.5	71.0	111.2	..	..	☽ 2 h.	27
.618	95.2	96.0	80.3	S.	Cirro-strati	.591	95.5	95.4	77.9	S.	Ditto	.573	91.0	88.4	74.0	S.	Cldy. to N. W.	96.6	86.7	76.8	112.3	..	..		28
.617	94.4	95.0	84.6	S.	Cirro-cumuli	.584	93.0	92.0	83.4	S.	Cloudy	.622	87.4	86.6	81.6	N.	Raining	96.0	86.4	76.8	107.6	1.11	1,16		29
.720	90.0	90 2	77.4	S. W.	Cirro-strati	.673	90.2	90.0	77.6	S.SW.	Cirro-strati	.666	86.4	84.6	74.0	S.SW.	Cirro-strati	90.6	81.5	73.0	105.5	..	..		30
29.729	93.4	94 2	78.0	....	.....	29.700	93.7	93.8	77.8	....	.....	29.708	89.8	88,1	77.4	....	.....	95,1	84.8	74.5	111.2	1,73	1.84	..	..